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UNIVERSITY OF ALBERTA

AN ANALYSIS OF THE INCOME DISTORTIONS FROM CANADIAN WHEAT BOARD PRICE POOLING

BY

© DAVID WILLIAM TUPPER

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

IN

AGRICULTURAL ECONOMICS

DEPARTMENT OF RURAL ECONOMY

EDMONTON, ALBERTA

FALL, 1990

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.....
M.L. Lerohl

.....
L. Bauer

.....
G. Mumey

Date: July 3 ..... 19 70

DEDICATION

This thesis is dedicated to my family: my wife Laura, and our son Gregory and daughter Nancy who entered our lives during this project.

ABSTRACT

This study examines regional income distribution effects among prairie grain producers of the price pooling policy of the Canadian Wheat Board. Wheat prices are hypothesized to be higher at west coast grain export terminals than at Thunder Bay which are the locations where prices enter the wheat pool. In addition, transportation costs east of Thunder Bay to St. Lawrence export locations are commonly shared by all pool participants and the pooling of these costs are an economic burden to western prairie wheat producers whose grain is largely moved to west coast terminals. Eastern prairie grain producers benefit from pooling by capturing a share of the higher west coast prices and by having all pool participants share the eastern transportation costs.

The changing costs and benefits over time of pooling these factors are calculated by province for the period 1973/74 to 1986/87. In the mid 1980's, Alberta wheat producers were foregoing roughly $25 per tonne by sharing west coast prices and paying for eastern transportation. In the early 1970's this value was less than $5 per tonne.

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I. THE NATURE OF THE INQUIRY

This thesis examines the income distribution patterns among export grain producers in the Canadian prairies due to the price pooling policy of the Canadian Wheat Board. Summary tabulations and analysis of the prices, the origin of grain and the transportation costs paid by prairie export grain producers to place their grain at several major Canadian grain export locations, form the basis of the inquiry. It is hoped that the results of this study will foster further investigation and allow policy makers and market participants the opportunity to reassess the future and direction of Canadian grain exports.

A. INTRODUCTION

The Canadian Wheat Board has a legislated mandate to market for export purposes, as well as for domestic human use, wheat and barley produced within the Canadian Wheat Board designated area [1]. This imperative is granted to the Canadian Wheat Board by the Canadian Wheat Board Act [2].

---

[1] The Canadian Wheat Board designated area is comprised of the provinces of Manitoba, Saskatchewan and Alberta and the Peace River region of British Columbia.

[2] Statutes of Canada, Bill 98, 25-26 George V, Chap.53 1935

Simply stated, the objectives of the Canadian Wheat Board are to: 1) market wheat and barley grown in western Canada to the best advantage of grain producers, 2) provide price stability to producers and domestic consumers and 3) ensure that each producer obtains a fair share of the available grain market (Canadian International Grains Institute, 1973).

The Canadian Wheat Board takes title to all grains delivered to it. At the point of delivery, which is generally at primary country elevators, the producer receives an initial payment minus adjustments for grade, handling, and rail transportation to the nearest export position, which is either Thunder Bay or Vancouver.[3] The annual initial payment price for each pool [4] is set by the federal Cabinet in consultation with the Canadian Wheat Board and is, net of the adjustments made at the point of

---

[3] The grain may leave Canadian territory at a variety of locations. For the purposes of transportation charges deducted from the producer's initial payment, the nearer of either Thunder Bay or Vancouver is used. This has interesting ramifications in north eastern Saskatchewan where the Port of Churchill is closer and, under the distance-related producer portion of the rail transportation charges, cheaper than shipments to Thunder Bay. The difference in the producer share of rail transportation costs between the actual point of export and the charged port is credited/debited to the pool. The barley pools priced basis Thunder Bay only.

[4] There are four pools: wheat, durum wheat, barley and designated barley. The designated pool is a special purpose pool restricted to barley for human consumption. Prior to August 1, 1989, the CWB also had authority to operate a pool for oats and designated oats.

delivery, a guaranteed floor price for each type of grain [5]. Once moved to export position, the grain is again graded and priced for export sale. The sale receipts are pooled by grain type and grade. Subsequent to the end of the crop year, using a weighted average of grade spreads calculated from actual spreads observed during the crop year, amounts in excess of the initial payment are distributed back to the producer on a pro rata participation basis [6]. These payments, which are net of the operating and overhead costs of the Board, are called the final payment. Producer net receipts from Board grain sales of equal type and quality differ only by the cost of transportation from farmgate to tidewater export position. Producers at the mid point [7] (in terms of rail freight costs) receive the lowest net receipts. Those closer to Vancouver or Thunder Bay enjoy higher net receipts as a direct function of their lower rail

---

[5] The CWB establishes the initial prices for different grades within each pool after the Cabinet, in consultation with the Board, has set the initial price for the base grade within that pool. The initial prices for these subordinate grades are supposed to reflect the market price spreads between grades. The imperative for this grade/price relationship within each pool stems from Section 26(5) of the Canadian Wheat Board Act.

[6] August 1 to July 31.

[7] The location furthest away from both Vancouver and Thunder Bay, the so called mid point, is at Scott, Saskatchewan. Scott is in the rail freight zone of 976 to 1000 miles from both ports. The weighted (volume times distance) average freight costs fall in the 901 to 925 mile freight zone. This reflects the volume of grain exported from Saskatchewan.

freight costs.

Aside from agronomic limitations, prices are the most important signal a producer has when making cropping decisions. The final payment for a given grade of grain is universal (net of the producer share of transportation costs[8]) for a period of 12 months. Within such a large geographic area as the Canadian Wheat Board designated area this practice runs counter to traditional economic theories of optimum local resource use. Agronomic and climatic conditions, export sales location and transportation costs to those export locations, are not the same throughout the region. Still, the price received for Canadian Wheat Board grains of a given grade and type is the same for all prairie export grain producers within the crop year.

B. THE INDETERMINATE SITUATION

The indeterminate situation this thesis addresses concerns only the income distribution patterns that stem from the Canadian Wheat Board's price pooling policy. Price pooling is a policy instrument with implicit economic ramifications. The underlying assumption is that orderly marketing is advantageous to western Canada's grain

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[8] Virtually all prairie export grain initially moves towards export location by rail. Under the regulations expressed in the Western Grain Transportation Act, 1984 (WGTA), the producer pays only a share of the actual transportation costs. The federal government pays the railways additional amounts deemed by this Act to be compensatory.

producers as a group (Wilson, 1978).

Canadian Wheat Board pooling ensures that all participants share crop year marketing opportunities. This system contributes to intra-seasonal price stability and shares market risk within the crop year, because all producers receive the same price for the same kind and quality of grain irrespective of origin or date of delivery. Canadian Wheat Board price pooling is not intended to pool the location of grain production since individual producers are responsible for all charges[9] to place their grain at the closer of either Thunder Bay or Vancouver.

Price pooling creates a universal base price for a given type and grade of grain that is a direct reflection of the actual prices received by the Canadian Wheat Board for that grade and grain. There appears to be a price differential -- the west coast premium - between the two primary locations of Canadian Wheat Board pool price determination: in-store in terminal elevators at the Ports of Vancouver and Thunder Bay. Grain of equal grade and quality appears to command a higher export price at west coast terminals than at eastern terminal locations. Part of

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[9] The CWB actually owns the grain once delivered to the primary elevator, and is responsible for its disposition. When grain is shipped to a terminal that is not the nearer/cheaper of either Thunder Bay or Vancouver, it is called an adverse movement. The producer pays freight charges to the nearer/cheaper port while the CWB pool pays the remainder.

this thesis investigates the proposition that there is a consistent price inequality between the eastern and western locations where grain is priced when entering the Canadian Wheat Board pool.

A review of historical grain prices indicates that there was near price equivalency between Thunder Bay and Vancouver until the early 1970's. Since then, changes to a number of structural market and cost factors have encouraged a positive price premium at Vancouver. The majority of Canadian Wheat Board grain moving eastward is moved by laker from Thunder Bay to tidewater ports on the lower St. Lawrence river. Ocean freight rates have declined relative to the domestic Thunder Bay-St. Lawrence laker costs, thereby favouring western shipments. There has been a major change in the export market that favours west coast shipments. This market change reflects both the increasing importance of Pacific Rim countries as grain importers and a decline in demand for wheat imports by western Europe.

Previous studies (Foodwest Resource Consultants 1979, Lyons and Carter 1984) have commented on the existence of a west coast wheat premium in an American context and have speculated that similar market conditions should exist in Canada. Harvey 1981, Dunlop and Lerohl 1987 and Dunlop 1989 hypothesized that the Canadian west coast premium is causing a distribution of pooled prices that

affects the equity [10] of grain producers across the prairies. Oleson and Brooks 1986a suggested that Thunder Bay and Vancouver enjoyed price equivalence until the 1960's. Since then, the combination of a relative and absolute decline in the importance of western European markets and an increase in grain exports to Pacific Rim countries shifted the pricing equivalency eastward from Thunder Bay to St. Lawrence ports, compared to Vancouver. Oleson and Brooks assumed that the Thunder Bay/St. Lawrence price differential is fully reflective of the transportation and handling costs of moving the grain from the Lakehead to tidewater. Oleson and Brooks noted that "as the transportation charges backed-off to producers [11] have not been changed to reflect the Vancouver/St. Lawrence export return equivalence, locational producer advantage to export position is not being adequately reflected".[12] Oleson and Brooks examine the justification for maintaining Thunder Bay as a price pooling point when its grain prices are not equivalent to Vancouver's. Noting that producers are

---

[10] The distribution of income and wealth. (Dunlop and Lerohl, 1988)

[11] This expression refers to the Western Grain Transportation Act assisted rail freight deduction made from the initial payment to producers, which reflects the producer share of grain transportation costs for moving grain from the primary elevator to the export terminal.

[12] Oleson and Brooks, 1986a, Basis Change For Initial Payment Freight Deductions, Canadian Wheat Board, p. 9

individually responsible for all costs incurred in moving grain to the point of export sale, they advance the proposition that more of the Thunder Bay-St. Lawrence transportation and handling costs should be borne by eastern prairie producers.

Groenewgen 1986 claims "that Canadian Wheat Board price pooling provides an important function in western Canada, which is to redistribute returns from the scarce resource of west coast capacity to all western grain producers". The existence of greater net returns on west coast grain sales (compared to Thunder Bay or St. Lawrence sales) suggests that "producer groups in the western portion of the prairies could feel that they are subsidizing producers in the eastern part of the prairies and could demand a distribution of export receipts that reflects west coast opportunities."

In addition to investigation of the west coast premium, this thesis will explore the cost shared by all pool participants of moving exported wheat from Thunder Bay to ports on the lower St. Lawrence River or to the Ports of either Halifax, Nova Scotia or St. John, New Brunswick. These costs are unlike the transportation costs to the western ports, which are borne completely by the individual producer under the favourable rates of the federal Western Grain Transportation Act (1984).

The Canadian Wheat Board recognized the existence of the west coast premium and made a proposal (Grain Matters,

November 1985), which was elaborated by Oleson and Brooks 1986a and Oleson and Brooks 1986b to partly accommodate it. Under this proposal, some grains (all wheats and some barleys) would have had their eastern pooling point changed from Thunder Bay to the St. Lawrence ports. All producers would have continued to pay rail freight to the export position that could be reached more cheaply, meaning that all producers in western Canada would have paid rail freight costs to Vancouver.[13] Under the proposal, this deduction would have been made from the initial payment at the point of delivery. Because this route is integral to the Canadian Wheat Board export system, they made the argument that the costs of trans-shipment from Thunder Bay to lower St. Lawrence ports should be directly apportioned to all prairie producers according to their location. The Great

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[13] Section 56 of the Western Grain Transportation Act 1984 (WGTA) compensates Canadian National Railways (CN) for hauling grain the extra 190 miles (306 km.) to Prince Rupert rather than to Vancouver. Under this legislation, Vancouver and Prince Rupert are deemed, for the purposes of transporting grain at statutory rates, as being equidistant from any point on the prairies. CN is the only rail line that connects the prairies with Prince Rupert. The concept is termed "Prince Rupert port parity".

A similar legislated statutory rate anomaly exists whereby Canadian Pacific (CP) is able to charge rates to Vancouver calculated as if the distance from Calgary to Vancouver were the same as the distance from Edmonton to Vancouver - an extra 123 miles (198 km.) This is because the Calgary to Vancouver route is estimated to have higher costs per mile. This anomaly is termed "the mountain differential".

These two factors permit the WGTA statutory rail structure to deem either of Vancouver or Prince Rupert to be equally attractive to prairie grain export shippers.

Lakes' shipping costs were to be entered into their respective grain pools and shared by all, as they are under the existing pooling policy. Under the Board's proposal, total freight costs borne by producers would have changed only in that the additional rail freight paid by producers east of the traditional mid-point would have helped make the pool accounts larger. The additional freight costs paid by eastern prairie producers would be a credit to the pool and would be returned to all producers, resulting in higher final payments. Western prairie producers would not pay more in extra freight costs, but would enjoy the higher final prices caused by the extra freight charges paid by eastern prairie producers. This proposal has not been implemented, possibly because the prairie grain economy was depressed during the mid to late 1980's. This policy would have shifted more of the transportation costs onto eastern prairie producers at a time when prices were low and transportation expenses were increasing due to the additional burdens placed on producers by the Western Grain Transportation Act.

Producers whose grain is commanding the higher price are sharing the price premium with producers whose grain is being priced and exported at the lower priced export port. Similarly, the pooled costs of eastern transportation may be further distorting the true returns to export grain production in the western prairies. The hypothesized

regional income distortion is the basis for the economic analysis within this thesis.

C. OBJECTIVES

The specific objectives of this study are to:

1. Conceptualize income distribution patterns due to Canadian Wheat Board price pooling.
2. Assess the existence, development and magnitude of the west coast premium as it applies to Canadian wheat exports.
3. Assess the development and magnitude of transportation and handling costs shared by Canadian Wheat Board wheat pool participants.
4. Define the magnitude of income redistribution due to the Canadian Wheat Board price pooling policy.

D. HYPOTHESIS

This analysis examines the hypothesis that existing Canadian Wheat Board price pooling policy is a substantive income redistribution policy instrument with clear regional economic winners and losers.

E. SUMMARY

This study primarily examines the effect of locational pricing differentials between the locations where grain receipts enter the Canadian Wheat Board's pools. The two major factors investigated are : 1) the existence of a

positive grain price differential in favour of the west coast and 2) the shared burden of domestic transportation for export grains east of Thunder Bay for export grains.

Chapter II establishes the domestic agricultural policy framework relevant to price pooling in the prairies and examines the economic criteria necessary to assess the extent of income redistribution in the Board area.

Chapter III presents the methodology used in the analysis and discusses the validity of the data.

Chapter IV presents the results of the analysis.

Chapter V presents the conclusions of the analysis and conceptualizes aspects of the problem.

Chapter VI is a discussion of the implications of the analysis and identifies areas worthy of future investigation and policy resolution.

II. PROBLEM SETTING

A. INTRODUCTION

This chapter is divided into two parts. The first part examines the general policy setting of Canadian and prairie agriculture, with emphasis on policy goals and the instruments used to implement these goals. It concludes with a perspective of the historical setting and sales policy of the Canadian Wheat Board.

The second part briefly examines the relevant economic theory that applies to price pooling in a regime where there is only one pricing location and in a setting in which there are multiple locations with price discrimination among them. This theory is extended to grain production in the Canadian Wheat Board area with a discussion of potential effects of market power on grain prices. This section concludes with a brief presentation of economically rational producer decision-making in light of shifting output prices.

B. POLICY BACKGROUND

Current Canadian agricultural policy is thought to have three objectives: to provide a) an adequate, dependable supply of high quality food at reasonable and stable prices;

b) fair and stable returns to farmers by reducing economic disparities; and c) increased efficiency, conservation of natural resources, economic development, improved quality of rural life and contribution to the world food supply (Agriculture Canada, 1977).

The 1986 National Agricultural Strategy reasserts these basic tenets in its statement of the role and responsibilities of the federal and provincial governments in sharing Canada's agricultural policy framework [1].

The policy challenge issued to the Canadian agricultural community by the Honourable Don Mazankowski, Minister of Agriculture, in the 1989 paper entitled Growing Together proposes that the foundation for the future of the industry rests on four pillars: more market reliance, greater self-reliance in the agri-food sector, the creation of policies recognizing regional diversity, and a view to a

---

[1] The shared jurisdiction between the federal and provincial governments has its roots in section 95 of the Constitution Act of 1867, commonly known as the British North America (BNA) Act. The responsibilities and scope of influence of each government is not precisely defined in practice, although the Constitution Act specifies that provincial governments hold authority over the production and marketing of agricultural products within their own boundaries while the federal government has jurisdiction over international and interprovincial trade. The National Agricultural Strategy (NAS) provides a principle for action whereby both levels of government have the right to intervene in the areas of finance, marketing, research, production assistance and income stabilization. The extent of the jurisdictional overlap and the novelty of the NAS still create impediments for agricultural policy-makers across the country.

sustainable environment.

The application of the principles enumerated above is sometimes qualified through having to balance: the concerns of economic and political regions, producers, and consumers; the shared jurisdiction among the provincial and federal governments; and the consideration of long-term goals versus perceived short-term market adjustments and aberrations.

Exposure to world markets removes some of the discretionary policy powers that Canadian and provincial governments have in domestic grain matters because Canada is signatory to the General Agreement on Tariffs and Trade (GATT), the International Wheat Agreement and, as it pertains to grain marketing, the Canada-US Trade Agreement (CUSTA, 1988). Considering the extent to which Canada's grain production is exported, this international exposure creates special difficulties in the formation and delivery of domestic agricultural policy.

Added to the problem of complying to international standards, is the difficulty that some policy instruments are inappropriate for delivering producer assistance due to the extent of export trade in some commodities. Canadian grains face elastic international markets (United States Department of Agriculture 1986a), which means that domestic agricultural assistance to producers, whether direct or indirect in the form of an input or transportation subsidy, will probably be, at least partly transmitted to foreign

buyers (Wilson and Tyrchnicwicz 1980). This reduces the efficiency and effectiveness of agricultural assistance as an income transfer or stabilization policy instrument.

Income stability is an integral part of Canadian agricultural policy. Agricultural incomes are subject to marked inter-year price and production variability. This is most pronounced in sectors whose prices are determined in world markets and in areas where agricultural production is dominated by the production of a limited number of related commodities. This aptly describes agriculture in the Canadian prairies.

C. HISTORICAL SETTING OF THE CANADIAN WHEAT BOARD

The Canadian Wheat Board, established as a Crown Agency by the enabling legislation The Canadian Wheat Board Act (1935), was preceded by two earlier federal wheat marketing boards.[2] These boards (the Board of Grain Supervisors (1917) and the Canadian Wheat Board (1919)) were established during World War I to market Canadian wheat due to the difficult marketing conditions caused by the War. Upon the

---

[2] The history of price pooling in the context of the Canadian Wheat Board is extensively documented. Refer to Britnell (1939), Fowke (1946 and 1957), MacGibbon (1932 and 1952) and Wilson (1972-74, 1978, 1979 and 1980). A number of Royal Commissions (13 this century) have recited the history of the Canadian grains industry. These Commissions have variously focused on market power and transportation issues, both of which are matters of critical importance to the sector.

cessation of hostilities, the federal government allowed the domestic market to revert to a private trade.[3] During the 1920's and the early 1930's, prairie producers experimented with a variety of cooperative marketing organizations. The Great Depression created international grain marketing problems that, in conjunction with drought and domestic political considerations, led to the federal government's creation of the current Canadian Wheat Board.

D. CANADIAN WHEAT BOARD OPERATIONS

The Canadian Wheat Board provides leadership in the prairie grain marketing and delivery system. Although off-Board marketing of Board grains is institutionalized for the domestic feed market, the volume of Board marketings, particularly of wheat, is such that the Board's influence is predominant. It purchases the wheat and barley grown in western Canada for export and markets them, either directly or through accredited agents around the world. It operates

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[3] The two World War I grain marketing boards were created using emergency powers. The reluctance of the federal government to continue these organizations was partly based on the ambiguous meanings of Section 91(2) and 91(13) of the British North America Act (1867) (BNA Act). These sections gave the federal government jurisdiction over the regulation of trade and commerce and the provinces jurisdiction over property and civil rights. Since grain and contracts are property, the federal government felt that grain matters were within the purview of the provinces. Subsequent legislation to establish federal regulatory power over the handling of grain relied on Section 92(10)(c) declaring that the grain handling system are works for the general advantage of Canada.

a quota system for producer deliveries to primary elevators, participates in the allocation of rail cars to move the grain from primary to terminal elevators, schedules vessels for deliveries to transfer elevators, and arranges for the sale of these grains. It owns only its main office in Winnipeg and a fleet of 2,000 railway cars. It uses grain companies, brokers and other commercial grain handling and transportation facilities to fulfil its mandate.

Canadian Wheat Board sales are made through long-term agreements and spot sales. Weekdays at 13:15 Central time, it sets export asking prices for each types and grade of grain at each port area. These reflect daily changes in world market conditions. In general, spot or daily sales are made on the basis of in-store prices at St. Lawrence or west coast ports. This means that the Canadian Wheat Board must pay all costs incurred in moving the grain to the terminal positions. As well, the storage charges from the date of delivery in-country to the date of export sale/delivery are borne by the Board.

Long-term contract sales are usually made on the basis of f.o.b. [4] vessel at the export terminal. Delivery points

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[4] f.o.b. Free on Board. The point and time of sale is when the grain is placed on board a vessel in a domestic port. The grain buyer assumes all costs and responsibilities thereafter. An alternative is c.i.f., Cost, Insurance, and Freight whereby the point of sale is on board the vessel in the buyer's port. The seller is responsible for all costs to that destination which is generally reflected in the sale price of c.i.f. shipments being higher than f.o.b. ones.

and dates are typically negotiated along with the price. Prices are established six to twelve weeks in advance of vessel loading. In these cases, the Canadian Wheat Board must pay all charges until the grain is actually on board the ocean-going vessel. Canadian Wheat Board sources indicate that in some recent years, almost 80 per cent of wheat sales have been made under long-term agreements.[5]

Prairie grain producers are constrained by law to market wheat and barley that is destined for export or human domestic consumption through the Canadian Wheat Board. The performance of the Board in marketing the main prairie crops is therefore crucial to the incomes of prairie producers. Section 5 (1) of the Canadian Wheat Board Act (1935) states:

> "Subject to regulations, the Board shall sell and dispose of grain acquired by it pursuant to its operation under this Act for such prices as it considers reasonable with the object of promoting the sale of grain produced in Canada in world markets."

The following statement from Canadian Wheat Board c, 1972-73 provides some insight into the sales policy of the Board relevant to this clause:

> "This clause instructs the Board to sell the grains under its authority competitively with the object of promoting the sale of them. A world divided between those who buy and sell, where competition is intense, does not provide assurance that competitive price levels will always be high enough to give producers a satisfactory return. In order to promote the sale of grain the onus for maintaining farm income must rest on agencies other than the one which has the

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[5] Canadian Wheat Board b, 1984/85, Annual Report To Producers

responsibility to market Western Canadian grains in the export market under ever-changing circumstances and conditions. The Wheat Board must be free to price as the markets dictate.

In order to do this and be effective in its sales efforts the Board must consider many factors when pricing its grain on the export market. Some of the more important are below.

- It must consider competitors' export prices. Under most market conditions those of the United States are of prime importance. However, there are exceptions to this depending on the Board's own assessment of existing conditions.

- The total exportable supplies of Canadian and other wheat must be considered, especially when world supplies are tight. At a particular time the quantity of grain already committed for sale and the amount remaining for additional sales are very important, especially when planning future sales strategy. Of major importance is Canada's reputation as a reliable supplier.

- The Board must consider variations in ocean freight rates which can alter the relationship between the delivered cost of Canadian wheat to the major overseas market area and the laid down cost from other sources of supply."

The quotation indicates that the Canadian Wheat Board's primary marketing mission is to sell as much grain as possible at competitive prices in international grain markets. It does not directly follow, however, that individual pool participants are, or have been, able to maximize their individual returns. If all of the Board's grain sales were made from the same port, irrespective of the price achieved for individual sales within the crop year, the pooling policy would return to each individual producer the average price of that crop year. Since there

are in fact sales from several different ports that appear to support differential pricing regimes, the pooled receipts represent not only an average annual price but also separate average prices between ports. This means that the pool averages the timing of prices as well as the location of price fixation. This second parameter, (i.e. differential pricing based on export location), is a contributing factor to the hypothesized loss of regional comparative advantage [6] within the prairies as a whole.

E. ECONOMIC ISSUES.

The two most significant issues treated by economic science are efficiency and distributional equity. Economic efficiency is viewed from the perspective of costs, both actual and opportunity costs, and can be broken down into two subsections: 1) physical economies which can be characterized as technical efficiency and 2) allocative efficiency which is associated with adjusting both factor

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[6] Comparative and absolute advantage are economic concepts that describe the basis for production and trade. By way of explanatory example, Tweeten (1979) says "suppose that the United States can produce a ton of wheat with two hours of labour and a ton of sugar with six hours of labour. Suppose, further, that Brazil can produce a ton of wheat for five hours of labour and a ton of sugar for ten hours. Then, based on the classical concept, the United States is said to have a comparative advantage in wheat, and Brazil in sugar. [The US wheat/sugar labour ratio is 1/3 while in Brazil, 1/2] The welfare of the two countries will be enhanced by the United States shipping wheat to Brazil in return for sugar, although the United States has an absolute advantage in the production of both commodities." Tweeten, Luther G., Foundations of Farm Policy, Second Edition (1979) revised, pp. 416-418.

use and output mix to relative prices.

Economic efficiency implies deriving the economically optimal output from limited resources. Technical efficiency measures the use of inputs in physical terms - the application of land, labour and capital to produce a specific output - to establish the "best" process of production. Allocative efficiency refers to the distribution of resources and production within an economy. Thus, allocative efficiency is the study of what and where to produce, whereas technical efficiency studies how to produce given the physical, capital and labour estate of the economy. Technical efficiency is not an issue in this study.

The other significant economic issue is equity - the distribution of the returns to production. Equity analysis examines who benefits from an existing situation and who bears the costs of maintaining it. The policy solution to an equity issue is income and wealth distribution that is consistent with desired economic and social welfare objectives.

F. SPATIAL PRICE MODELS

Geographical price relationships can be analyzed in a formal way using spatial price equilibrium models. Through a set of specified assumptions, these models generate the net price that will prevail in each region or market and the

quantity of the studied commodity that a region will trade with any other region within the system. These models determine the optimum or least-cost trading pattern on the basis of the supply and demand relationships within each region.[7]

A solution (i.e. a production and trading pattern) involving many regions entails the algebraic expression of the supply and demand schedules for each region, as well as the transfer costs from each region to every other region. The summation of the regional supply and demand schedules creates the equation of an aggregate supply and demand schedule, which in turn generates an equilibrium price. Once this equilibrium price is known, the net price in each region can be estimated by using appropriate differentials based on transfer and price differentials that have existed in the past.

The derived estimated net prices can be inserted into the regional supply and demand equations to determine regional production and consumption. The difference between estimated consumption and the available supply in each region represents the total volume available for trade. The

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[7] See Heady and Candler, 1961, Linear Programming Methods pp. 231-233, for the general principles in developing a graphic inter-regional trade model graphically using two regions. Day and Sparling in "Optimization Models in Agricultural and Resource Economics" in a Survey of Agricultural Economics Literature, Volume 2, (1977) summarize the literature relating to optimization spatial equilibrium models.

least-cost, or optimum trading pattern is determined by linear programming (Heady and Candler 1961), such that the requirements of the deficit regions are met by supplies from the nearest (cost-effective) surplus area. If the initially assumed regional price spreads are inconsistent with the final solution, it is necessary to recalculate the equilibrium price since the demand or supply of each region is dependant on these price differentials.

These models have been widely used in assessing market performance. They provide a standard upon which actual market prices in different regions can be assessed. Differences between model and observed price differentials can be due to the rigidity of model specifications and/or to market imperfections and inefficiencies. King 1963 observed that the correlation between existing prices and those obtained from least-cost solutions is frequently no higher than 0.5 and in some cases is as low as 0.2.[8]

G. DOMESTIC TRANSPORTATION PRINCIPLES

If producers in a region/country have the option of shipping a product to different markets, the boundary between supply areas is determined by the price at each destination less the cost of transportation. Given a choice, producers will ship to the market offering the

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[8] Tomek and Robinson, 1981, Agricultural Product Prices, p. 163.

highest net price. The boundary between two markets will change if the relative price relationship between those two markets changes or if there is a change in the transportation costs to different markets. In general, if prices are equal at the two markets and the costs of transportation are a positive constant linear function of distance, producers will ship to the nearest market. The producing area that serves a consuming market is termed a catchment basin or area of that market.

Figure II.1 illustrates hypothetical transportation costs faced by producers to Thunder Bay and Vancouver. The producer's net income from grain sales (pooled returns) is a direct function of transportation costs if prices are equal at both locations. The slope of the lines originating at Vancouver and that to the left (west) of Thunder Bay, is equivalent to the unit costs per mile of the producer share of rail transportation costs. In this instance, the slope is $0.0075 per tonne per mile, which equals $7.50 per tonne for a 1,000 mile shipment.

FIGURE II.1

TYPICAL DISTRIBUTION OF RETURNS FROM POOLING TRANSPORTATION COSTS

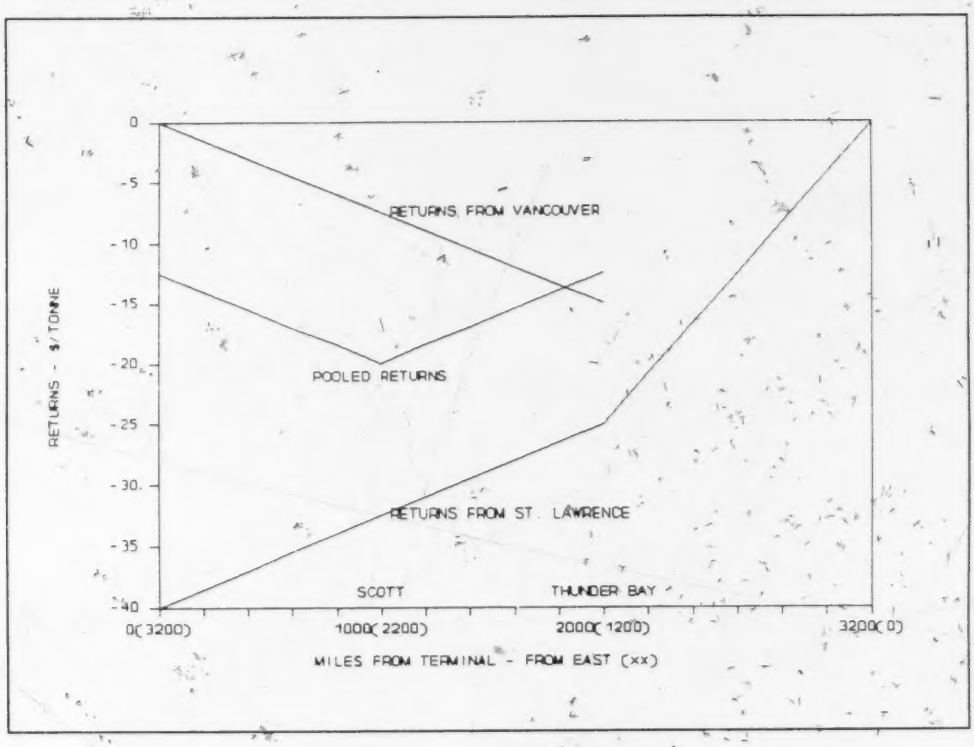


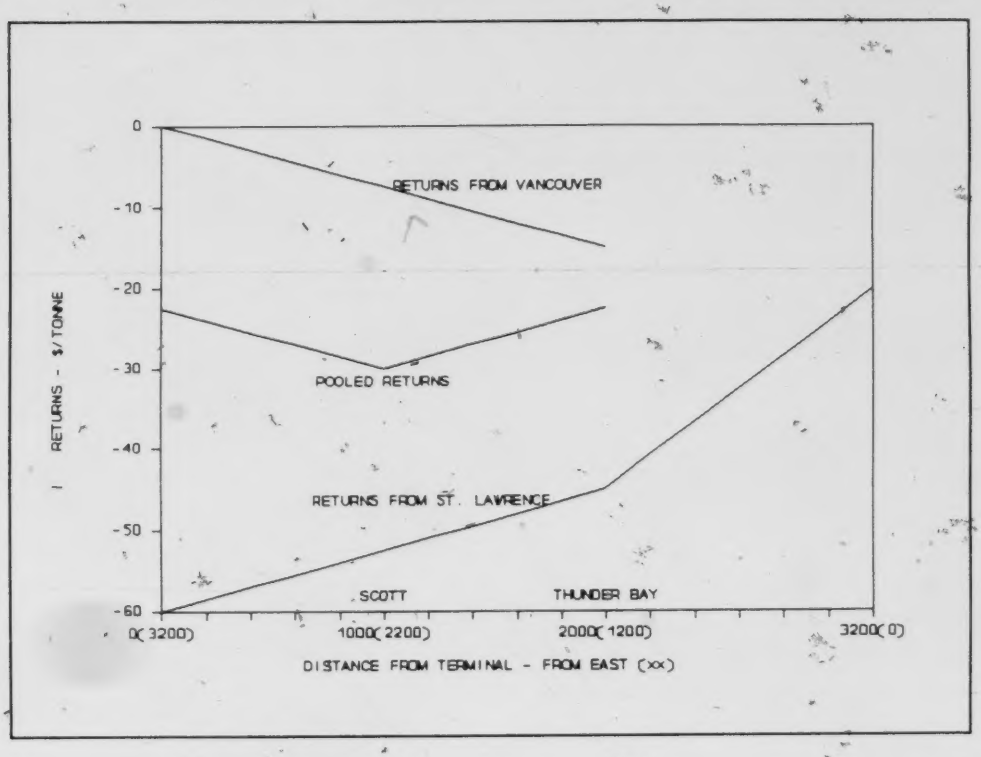
Figure II.1 also illustrates the concept of pooling costs from Thunder Bay to St. Lawrence ports. Lake freight costs are $25 per tonne. Prices are assumed to be equal at Vancouver and St. Lawrence ports and are pooled at Thunder Bay and Vancouver. Export movements are assumed to move equally to both locations. Producers only see the rail freight portion of total transportation costs because this portion is deducted directly from their initial payment. The shared Thunder Bay to St. Lawrence costs are a charge to

the pool and serves to lower the value of pooled returns. Producers whose grain is produced west of the mid point (Scott) and is moved to Vancouver face an additional $12.50 per tonne (the percentage of grain moving east times the unit cost of that movement) in pooled transportation costs compared to what a non-pooled marketing system would indicate.

Producers east of Scott receive a benefit equal to the cost borne by producers west of Scott. This is the difference between the pooled returns line and the returns from St. Lawrence line. Figure II.2 assumes that the Vancouver price is higher than the St. Lawrence price by $20 per tonne. The foregone benefit to western prairie producers is composed of the pooling of eastern transportation costs, ($12.50 per tonne in the previous figure) and, half of the price differential. The combined effect is a loss of income to producers west of Scott of $22.50 per tonne, as is represented by the distance between the pooled returns line and returns from Vancouver line.

FIGURE II.2

DISTRIBUTION OF RETURNS WHEN THE WESTERN PRICE IS $20 HIGHER



H. THE INFLUENCE OF MARKET POWER

One of the market imperfections that might cause a spatial equilibrium model to mis-specify inter-regional prices is the ability of one or several firms to exert market power on them. This behaviour is typical of monopolist/monopsonist and or oligopolistic markets. Under some circumstances, firms possessing market power can affect regional price differentials by factors greater than what inter-regional transfer costs alone would support. The

international grain trade is very concentrated because there are relatively few sellers or buyers. Many authors have attempted to characterize the international grain trade in terms of its behaviour and market power.

It is possible for a monopolist to increase its revenue by charging different prices for the same commodity in different markets. Two conditions must be met (Tomek and Robinson 1981). First, it must be possible for the monopolist to identify two or more separate groups of buyers with different price elasticities of demand [9]. Second, the markets must be effectively separated to prevent a flow of the commodity between the markets and it should also not be possible to buy the product in the low priced market and sell it profitably in the high priced market. Tomek and Robinson go on to point out that markets may be differentiated on the basis of: a) place or location (domestic and export), b) time (capturing seasonal variations in supply or demand), c) form or use of the product (bread making wheat vs. feed wheats) d) type of

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[9] Elasticity is an economic term describing the sensitivity of commodity market performance to a variable factor. For example, a commodity is price-elastic when a small downward change in price causes a large increase in the quantity demanded (sales). Inelasticity refers to a response in the quantity demanded that is less than the percentage change in price. A commodity may exhibit different price elasticities in different segregated markets. Elasticity can describe the commodity's response to other market characteristics such as consumer incomes, price of inputs, etc.

consumer (one time or favoured client) or e) any combination thereof. Any of these factors would contribute to different price elasticities of demand by grain buyers and could allow a monopolist such as the Canadian Wheat Board the ability to discriminate among its grain buying clients in terms of price. These factors could also allow the Canadian Wheat Board to establish price regimes that are not solely a function of domestic transportation and handling costs at different export terminals.

The degree of competition and the ability of the Board to differentiate Canadian grain (or grades within a grain group) in place, time or quality from other export grains is the extent to which the Board could price discriminate. Abel 1966 suggests that wheat exporters could sell wheat to developed countries (many of whom have high internal price supports and price-inelastic demands) at higher prices than to developing countries because the latter tend to have more elastic price demands. It should be noted that until the mid-1970's, it was felt that the Canadian Wheat Board had price leadership powers.[10] Since that time, it has been argued that the Canadian Wheat Board has lost much of this power to other market forces.[11]

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[10] See McCalla (1966), Abel (1966), McCalla (1970) and Alouze, Watson and Sturgess (1978)

[11] See Josling (1977), Carter and Schmitz (1979), Oleson (1979) Schmitz et al (1981) and Perkins et al (1984).

In the world wheat trade, the Canadian Wheat Board goes to great lengths to encourage Canadian growers to produce a limited number of high protein, homogenous and clean wheats. The Board aggressively markets these wheats in the trade as a differentiated product compared to the wheat exports of other nations. The extent or existence of premiums received for these differentiated grades are not known.

The ability of the Canadian Wheat Board to foster a situation that allows it to discriminate prices among customers is to some extent supported by the willingness of the Board to supply these grains through different Canadian export ports. This is particularly true of grades of wheat and barley for human consumption. Feed grades of these grains are widely available in the international grain market, while the human consumption grades are less so.

Canada, like the United States, has the ability to ship from both coasts into global markets. The United States also has the Gulf ports from which more than half of that county's grain exports are made. The high cost of domestic transportation to some extent delineates the direction of export grain movements. Other factors, including market demand, transportation assistance, the availability of domestic transportation, government regulation and trade policy, can each have a determining effect on the choice of export port.

The analysis of both market performance and the

behaviour of firms within that market can lead to observations concerning the welfare of industry participants. The performance of the Canadian Wheat Board in maximizing returns to all prairie grain export producers may not be the same as providing the true returns on resource allocation to individual producers. In fact, the Board's employment of such a device as price pooling to distribute the net revenues from grain export sales to producers subjugates the maximum potential returns to the individual in favour of the welfare of all producers as a group.

I. PRODUCER DECISIONS

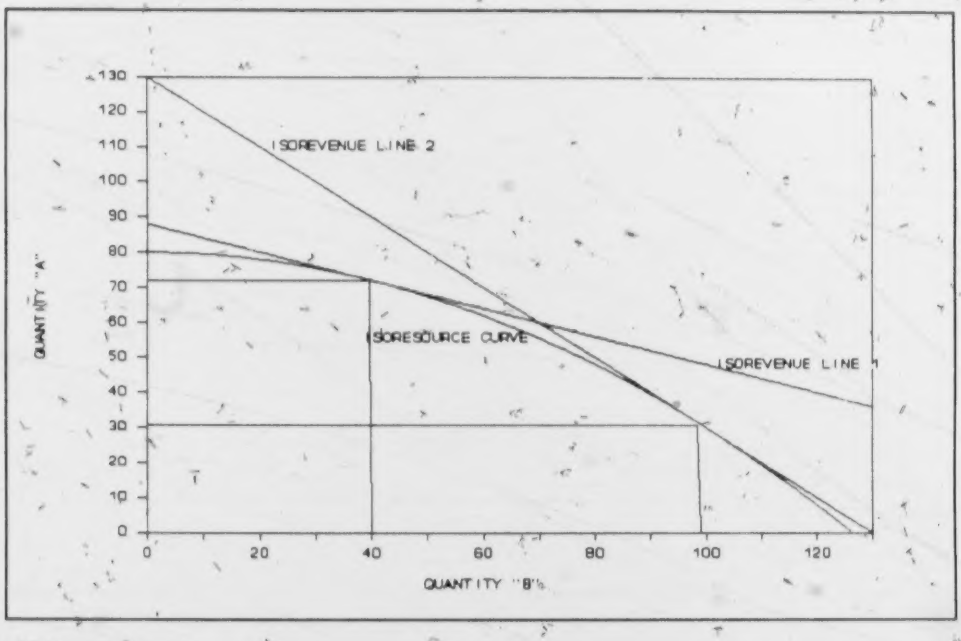
The price of an individual grain is important to a producer due to its relation to the price of other commodities. At a given point in time, the producer has a given set of resources at his command with which he can produce a variety of different commodities. The producer chooses that combination of outputs which will maximize his net revenue given this set of resources. Since revenue is a direct function of volume times price (quality being included in the price), he must decide the quantities of each different commodity to produce.

Figure II.3 is a graphic illustration of the economic principles involved in this form of enterprise selection. Assume that a given producer has a finite set of resources

that can be employed at a given point in time in the production of commodities "A" and "B". This production frontier is represented by the isoresource curve.

FIGURE II.3

PRODUCTION POSSIBILITIES FOR TWO COMMODITIES



Notes:

1. The mathematical expression of the isoresource curve is: $B = 80 - .005 \times A^2$

2. Isorevenue Line 1 represents the case where the price for A and B are equal and has the expression: $B = 130 - A$.

3. Isorevenue Line 2 represents the case where the prices of A and B are \$2 and \$5 respectively and has is expressed as $B = 88 - (2/5 \times A)$.

In Figure II.3, the isoresource line represents the combinations of A and B that he can produce. He can produce any combination of A and B within the frontier, but the isoresource line defines the revenue-maximizing combination of outputs for any set of commodity prices. In the first instance, that the prices of commodities A and B are $5 and $2 per unit respectively. This is graphically represented by "Isorevenue line 1" with a slope of -2/5, which for illustrative purposes is tangential to the isoresource curve where the quantity A equals 72 and quantity B equals 40. Mathematically, the maximum revenue combination can be solved such that the producer can achieve no greater revenue than $440 by producing those quantities of output given his isoresource frontier.

Suppose that the price of commodity B were to increase to $5 per unit such that both commodities were equally priced. The new isorevenue line expressing the relative prices of A and B has a slope of -1 (Isorevenue Line 2) and when tangential to the isoresource curve yields a revenue-maximizing production mix of 32 units of A and 100 units of B. This price relationship causes revenue to increase to $660, which is the maximum revenue a producer can derive from the production of A and B given the new prices.

In the short term (one or two production periods) this producer would be able to change his cropping pattern among the two crops to maximize his reduced revenue frontier given

his relatively fixed compliment of resources. In the longer term, the producer would be able to choose among other enterprises to increase his revenue. In this case his isoresource curve, or production possibilities, would be different.

This example can be extended spatially to the pooling policy of the Canadian Wheat Board. If wheat producers in Alberta are faced with a set of production possibility curves, and the pooled price is not an accurate reflection of the true value of their wheat, they may not be making the most efficient choice in terms of what crops or other output to produce. Not only would these producers not be receiving prices reflecting their proximity to export sales terminals and thereby suffering an income loss, but the price distortion may also be of sufficient magnitude to affect their cropping pattern or enterprise mix.

J. SUMMARY

A major hypothesized economic effect of the Canadian Wheat Board's price pooling is that it discourages the production of grains according to their comparative advantage because artificial masking of the true returns to the land exists. The Board's price pooling system distorts true spatial prices for grains within Canada and so affects resource allocation and crop production. If this is true, there is some degree of economic inefficiency within the

pricing system since the pooling system does not accommodate the price distortion within it. If the price distortion is of sufficient magnitude, both technical and allocative efficiency are impaired in both theoretical and practical application. The extent of the impairment may be such that the appropriateness of the product and the production process or intensity of production are called into question. This, however, is an indeterminate situation that deserves to be explored.

III. ANALYTICAL PROCESS

A. INTRODUCTION

This chapter reviews the analytical process used in this study. The objectives of the research are to quantify the existence, development and magnitude of the factors that have led to intra-port wheat price discrimination and to assess the impact of this pricing relationship as the pooling policy distributes these returns to prairie export grain producers.

B. CONCEPTUAL ANALYSIS

The definitive approach to the analysis would be to monitor the value and timing of actual grain sales over an extended period. This would allow the direct calculation of an east-west price differential for similar grades of grains. These differentials or locational premiums could be matched with the regional sources of the grain sales. Integration of grain transportation costs would lead to the discovery of the regions not reaching their potential income advantage.

Several factors conspire against the practical application of this methodology. Foremost is the lack of a

documentation matching the timing and pricing of wheat exports and domestic shipments. This lack of verifiable information affects both the pricing of the Canadian export grain and the discovery of actual grain handling and transportation costs.

The true magnitude of the price differential (actual west coast premium) is not subject to direct documentation because the Canadian Wheat Board does not publish or make its actual prices public knowledge except in a gross revenue sense at the end of the crop year through its annual reports to producers and the Minister responsible. It does not make known, for example, what each shipload, on specific dates, is actually sold for. In the absence of actual transaction values, approximations of grain prices and transportation costs are necessary to calculate the income effect on prairie grain producers of intra-port price discrimination and shared domestic transportation and handling costs as reflected in the Canadian Wheat Board wheat pool.

The following table is a presentation containing the major elements of this analysis. The table indicates that actual market returns to producers are a function of the direction of movement, costs of transportation and handling, and the price received for wheat at different export terminals.

TABLE III.1

ANALYSIS OF PRICES AND COSTS ASSOCIATED WITH MOVING WHEAT FROM EXPORT POSITION TO MID-PRAIRIE POINT TO DETERMINE VALUE TO PRODUCER

	St. Lawrence (Quebec City)			Vancouver		
	Distribution Cost		Net Back Value	Distribution cost		Net Back Value
	($ per tonne, 1 CWRS 13.5%, 1985/86)					
Selling Price, Export Position			249.00			241.00
Transfer Position	3.85		245.15			
- Storage		1.45				
- F.O.B Charges		2.40				
Lake Transportation	19.77		225.38			
Terminal Position	6.61		218.77	6.60		234.40
- Storage		1.37			1.37	
- F.O.B. Charges		5.24			5.23	
Marketing	3.30		215.47	3.30		231.10
- Interest, etc.		2.33			2.33	
- CWB Administration		0.97			0.97	
Railway Freight (Producer Share)	6.30		209.17	6.30		224.80
Primary Elevator	12.21		196.96	12.21		212.59
- Elevation		6.09			6.09	
- Removal of Dockage		1.67			1.67	
- Shrinkage		0.40			0.40	
- Carrying Charges		4.05			4.05	
Value to Producer at Mid-Prairie			196.96			212.59

Source: Derived from Canada Grains Council, 1985/86, Canadian Grains Industry Statistical Handbook .

C. CONSTRAINTS

A major component of the analysis is the discovery or approximation of grain prices received by the Board at different export locations. Several alternatives exist to establish approximations of these prices. One method is to use the asking prices the Canadian Wheat Board issues daily for the different export ports. A second alternative is to correlate export grain prices at United States export terminals to comparable Canadian locations. A third alternative is to back off ocean freight and handling charges from internationally posted c.i.f. prices to Canadian ports. A fourth alternative, and one used by the Canada Grains Council 1989 and Gilmour and Fawcett 1986 and 1987, is to use data published in Exports by Commodities, (Statistics Canada (a)) which summarizes the values of exports by commodity and export location. Each of these four pricing alternatives is deficient in some respect. The selection of the best price series to test the hypothesis is crucial to this study. A detailed discussion of each alternative follows.

C.1 CANADIAN WHEAT BOARD ASKING PRICES

In the absence of actual prices for analysis, Canadian Wheat Board asking or quoted prices could represent surrogate Canadian export grain prices. The series is available for all major Canadian export locations.

These quoted prices are asking prices and represent threshold prices for the subsequent negotiation of actual pricing. The asking price is an offer to any buyer. Buyers with some favoured status (such as a partner in a long-term agreement or a large volume purchaser) could be expected to negotiate a lower price than the asking price. If this were the case, the average actual sales prices would be lower than the average asking price over time.

For purposes of this research, this presumed difference does not invalidate the nature of the facts unless there is a bias between the asking prices and the actual prices between the export ports for which the prices are quoted. For example, if there were some pattern in the difference between the actual and asking prices between the Thunder Bay and Vancouver, bias would enter the computation of the apparent west coast premium.

While the purpose of the analysis is to quantify the difference in prices for the same type of wheat entering the wheat pool, the use of Canadian Wheat Board asking prices is not, in theory, the only approach available. The most serious qualification concerning the use of asking prices is that they are not transaction prices, but are in some sense a shadow of the actual transaction prices. The relationship between the actual and publicly quoted price could perhaps be approximated. This will not be attempted in this study. If it is assumed that as long as the pricing relationship

between the asking and the actual price is constant among export ports, then it is immaterial whether the actual sales price or the published bid price is used in assessing the value of the apparent west coast premium.

An extensive literature review has not revealed an authoritative source that documents the existence of an intra port difference between Canadian Wheat Board asking prices and actual transaction prices.

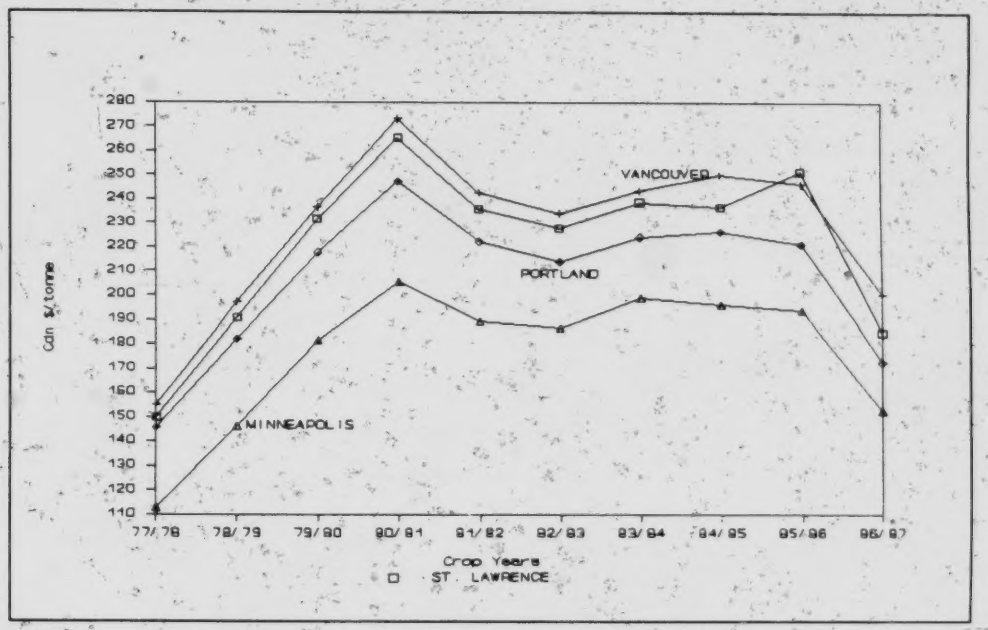
C.2 COMPARABLE UNITED STATES WHEAT PRICES

Given that Canadian Wheat Board asking prices are not actual transaction prices, a good correlation between Canadian and published US grain prices could be used to approximate actual Canadian Wheat Board sales prices. The American prices are averages of actual cash or transaction prices. Such a comparison entails the use of spatially comparable American ports and grades of wheat. The use of American prices could overcome the possible imprecision of using Canadian Wheat Board asking prices, which are not transaction prices. As well, the correlation between American and Canadian wheat prices could be used to verify the legitimacy of the Canadian price series.

The quotation in the first chapter (pp 19-20) concerning the sales policy of the Canadian Wheat Board indicates that the primary influence on the Board's pricing

FIGURE III.1

AVERAGE ANNUAL PRICES FOR WHEAT AT CANADIAN AND AMERICAN PORTS, 1977/78 TO 1986/87



Note: The Canadian prices are average annual asking price quotes for 1 CWRS (Canadian Western Red Spring), 13.5%, f.o.b., while the American prices are 1 DNS (Dark Northern Spring), 14%, also f.o.b.. These are comparable, but not equivalent grades of wheat.

Vancouver and Portland are roughly equivalent continental export locations. St. Lawrence and Minneapolis are not equivalent locations since Minneapolis is near the head of the Great Lakes. There is no equivalent American pricing point to St. Lawrence terminals.

SOURCE: International Wheat Council, World Wheat Statistics, annual issues, 1977/78 to 1986/87, and United States Department of Agriculture Wheat Situation and Outlook Report, Annual issues, 1977/78 to 1986/87

practices was the presence of competitive American grains. There should be a fairly stable relationship between Portland and Vancouver in the west and Minneapolis and Thunder Bay/St. Lawrence in the east. Figure III.1 graphically shows what appears to be a fairly stable relationship between the United States cash prices and the Canadian Wheat Board asking prices on an Canadian crop year basis. With the exception of the 1984/85 and 1985/86 St. Lawrence price, all four price series exhibit a relatively constant relationship in both direction and magnitude. This supports the Canadian Wheat Board's contention that it prices its grain with a view to local competition. Further, it lends credence to the use of Canadian Wheat Board asking prices as approximations of actual transaction prices.

TABLE III.2

MATRIX OF R^2 VALUES OF REGRESSIONS OF MONTHLY AVERAGE WHEAT PRICES AT SPATIALLY COMPARABLE CANADIAN AND AMERICAN TERMINALS, 1974/75 TO 1986/87

	St. Lawrence	Vancouver	Minneapolis
St. Lawrence, 1 CWRS 13.5%			
Vancouver, 1 CWRS 13.5%	.9616		
Minneapolis, 1 DNS 14%	.9291	.9641	
Portland, 1 DNS 14%	.9325	.9649	.9571

SOURCE: Calculated from International Wheat Council, World Wheat Statistics, annual issues 1974/75 to 1986/87, and United States Department of Agriculture, Wheat Situation and Outlook Report, annual issues, 1974/75 to 1986/87.

TABLE III.3

MATRIX OF X COEFFICIENTS FROM CORRELATION AMONG WHEAT PRICES AT SPATIALLY COMPARABLE CANADIAN AND AMERICAN TERMINALS, 1974/75 TO 1986/87

	St. Lawrence	Vancouver	Minneapolis
St. Lawrence, 1 CWRS 13.5%			
Vancouver, 1 CWRS 13.5%	.9788		
Minneapolis, 1 DNS 14%	.8404	.8575	
Portland, 1 DNS 14%	.8358	.8518	.9855

Note: In the standard regression equation $Y = a + bX$, "a" is the constant, "b" is the X coefficient and "Y" and "X" are the independent and dependent variables, respectively. Perfect correlation would be expressed as $Y = 0 + 1X$

SOURCE: Calculated from International Wheat Council, World Wheat Statistics, annual issues 1974/75 to 1986/87, and United States Department of Agriculture, Wheat Situation and Outlook Report, annual issues, 1974/75 to 1986/87.

Tables III.2 and III.3 report a regression analysis of monthly average wheat prices at St. Lawrence and Vancouver and the spatially comparable American terminals of Minneapolis and Portland. Time series correlation among all four price series is very strong and statistically significant at the 0.01 level. The correlation is stronger between Vancouver and Portland and weaker between St. Lawrence and Minneapolis (Table III.2). The sign of the constant in each regression series was correct, as the relationship in Figure III.1 illustrated. The X coefficients show strong relationships with each other.

Perfect correlation in a stable price differential environment would have yielded an X coefficient of 1 and the constant would represent the price differential between ports. Because it is believed that the east-west price differential is growing, the correlation should not behave perfectly. It is notable that the X coefficient of .9788 between the prices at the Canadian terminals of Vancouver and St. Lawrence indicates a relatively strong and constant price relationship between the two ports. The X coefficients between the spatially comparable Canadian and American ports are somewhat smaller, indicating weaker, but still strong, price relationships.

Table III.4 compares the apparent American and Canadian west coast premiums using comparable pricing locations in each country. It should be noted that in Figure III.1 (p 43), St. Lawrence and Minneapolis are not comparable pricing locations as are the western ports of Vancouver and Portland. The apparent American east/west price differential was more than double the Canadian apparent premium until 1980. The apparent Canadian west coast premium grew over this period, while the American price differential decreased. In the 1970's, the difference between the Canadian and American price differential was fairly constant at about $20 per tonne. In the 1980's, the relationship between the inter-country apparent west coast premiums changed such that the Vancouver-Thunder Bay price

TABLE III.4

COMPARISON OF THE APPARENT WEST COAST PREMIUM, UNITED STATES AND CANADA, ANNUAL AVERAGE AMERICAN AND CANADIAN WHEAT PRICES, 1973/74 TO 1986/87

$Can/tonne

	Portland/ Minneapolis Differential * (1)	Vancouver/ Thunder Bay Differential ** (2)	American/ Canadian Differential (1 - 2)
1973/74	27	6	21
1974/75	39	8	31
1975/76	40	18	22
1976/77	34	12	22
1977/78	33	15	18
1978/79	36	17	19
1979/80	36	18	18
1980/81	42	23	19
1981/82	33	24	9
1982/83	27	25	2
1983/84	25	24	1
1984/85	30	33	(3)
1985/86	28	16	12
1986/87	20	37	(17)

* 1 DNS 14%
** 1 CWRS 13.5%

SOURCE: Calculated from International Wheat Council, World Wheat Statistics, annual issues 1974/75 to 1986/87, and United States Department of Agriculture, Wheat Situation and Outlook Report, annual issues, 1974/75 to 1986/87.

differential became larger than the spatially comparable American price differential. This was largely due to a decline in the American west coast premium. One of the reasons causing the American price differential to decline may have been a changing freight relationship between Minneapolis-St. Lawrence ports compared with the Minneapolis-Gulf ports route. This may be exacerbated by a relative decline in ocean freight rates favouring the Gulf ports.

To the extent that Thunder Bay prices are St. Lawrence f.o.b. minus Great Lakes/St. Lawrence Seaway System costs, rising domestic transportation costs on this route could be lowering the Thunder Bay price. This would have the effect of increasing the Thunder Bay/Vancouver price differential if there was a relatively constant St. Lawrence/Vancouver price relationship. As will be discussed later, there has been a change in global market forces that has increased the Vancouver price relative to the St. Lawrence price.

C.3 OCEAN FREIGHT RATES

Several authors (The Churchill Working Group Efficiency Subcommittee 1985, Westburne Consultants Limited 1982, Hall 1985, and the Canada Grains Council 1984) have studied the use of Churchill as a grain export route. The conclusion has been that the Board, within reason, prices grain at export terminals so that the purchaser is

indifferent to the grain's port of origin when ocean freight rate differentials are considered. For example, if the ocean freight rates to Country X from St. Lawrence ports and Pacific ports differed by $10/tonne, then the Board could and does create an offsetting grain price differential so that the customer in Country X is indifferent to the port from which his imported grain originates. Grain buyers sometimes ask for quotes from several ports c.i.f. to reinforce competitive pricing at export locations.

It is possible to create a spatial equilibrium model of ocean freight rates (as explained in the previous chapter) that would generate a value for grain anywhere in the world. It would therefore be possible to establish what prices were entering the Canadian Wheat Board's wheat pool at various Canadian export terminals. Comprehensive price series for c.i.f. shipments are available basis Japan and Rotterdam [1]. Since few shipments to Japan are made from St. Lawrence ports, these data, while spatially comprehensive, may not be entirely representative due to the small volumes on the St. Lawrence to Japan route.

Ocean freight rates for grain are a complex function of: shipping availability; the potential for front or back hauls; the depth of the loading and unloading harbours; the nationality of the shipper and grain buyer; the time of

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[1] International Wheat Council, World Wheat Statistics, Annual Issues

year; shipping distance; vessel size; loading facilities; and insurance and interest rates. However, to test this kind of analysis using observed freight rates, Table III.5 develops the relationship between annual c.i.f. prices in Japan, ocean freight rates and f.o.b export prices at Vancouver between 1976/77 and 1985/86. The ocean freight rates used are annual averages found in International Wheat

TABLE III.5

DERIVATION OF C.I.F. JAPAN OF CANADIAN WHEAT USING OCEAN FREIGHT RATES

$US per tonne

	(1) 1 CWRS f.o.b. Pacific	(2) Ocean Freight	(3) (1) + (2)	(4) Observed c.i.f Japan	(5) (4) - (3)
1976/77	142	15	157	154	(3)
1977/78	137	14	151	146	(5)
1978/79	164	18	182	179	(3)
1979/80	202	30	232	234	2
1980/81	230	31	261	264	3
1981/82	201	27	228	234	6
1982/83	190	18	208	224	16
1983/84	193	18	211	227	16
1984/85	188	19	207	212	5
1985/86	180	18	198	207	9

Source: Derived from International Wheat Council, World Wheat Statistics, annual issues, 1976/77 to 1985/86.

Council (a) annual issues. Annual averages are based on a polling of carriers who may not, for reasons of competitive advantage, wish to be completely forthcoming on their tariffs. For this reason, the quoted rates may be somewhat inflated and erratic due to the competitive nature of ocean shipping. This problem is not unlike the discretion used by the Canadian Wheat Board in its asking prices. As can be seen, the relationship is reasonably close for the first half of this period. In the latter half, however, there is a somewhat larger difference between the sum of the export f.o.b. price plus the ocean freight and the quoted c.i.f. price.

Although the overall relationship is reasonably robust, it would appear that at least one of the three data sets used is not precise. The observed differences are for the most part less than four or five percent of the price of the grain landed in Japan. It is critical to note, however, that the values in column 5 (difference between f.o.b. price plus ocean freight and the c.i.f. price in Japan) are as high as ten percent of the net price that the Prairie wheat farmer ultimately received. The precision necessary to establish the intra-port actual price difference may hinge on differences as small as these.

The assailable component may be the f.o.b. Pacific export price, which is the annual average Canadian Wheat Board asking price converted to f.o.b.. The Canadian Wheat

Board asking price is not a transaction price, and its validity as a basis for the calculated f.o.b. price can be questioned. The same test is conducted on 2 DNS 14% basis Portland (Table III.6) to test an actual transaction f.o.b. price. Table III.7 further examines the relationship of c.i.f. prices, ocean freight rates and f.o.b. prices using St. Lawrence 1 CWRS and Rotterdam as the grain and ports.

TABLE III.6

DERIVATION OF C.I.F. JAPAN OF AMERICAN WHEAT USING OCEAN FREIGHT RATES

$US per tonne

	(1) 2 DNS f.o.b. Pacific	(2) Ocean Freight	(3) (1) + (2)	(4) Observed c.i.f Japan	(5) (4) - (3)
1976/77	136	15	149	148	(1)
1977/78	129	14	143	138	(5)
1978/79	151	18	169	168	(1)
1979/80	186	30	216	220	4
1980/81	210	31	241	243	2
1981/82	184	27	211	215	4
1982/83	174	18	192	210	18
1983/84	178	18	196	213	17
1984/85	170	19	189	196	7
1985/86	161	18	179	192	13

Source: Derived from International Wheat Council, World Wheat Statistics, annual issues, 1976/77 to 1985/86.

TABLE III.7

DERIVATION OF C.I.F. ROTTERDAM OF CANADIAN WHEAT USING OCEAN FREIGHT RATES

$US per tonne

	(1) 1 CWRS f.o.b. St. Lawrence	(2) Ocean Freight	(3) (1) + (2)	(4) Observed c.i.f Rotterdam	(5) (4) - (3)
1976/77	139	5	144	146	2
1977/78	133	5	138	147	9
1978/79	158	9	167	166	(1)
1979/80	198	16	214	216	2
1930/81	223	17	240	236	4
1981/82	196	10	206	214	8
1982/83	185	7	192	194	2
1983/84	190	8	198	208	10
1984/85	177	9	186	188	2
1985/86	182	8	188	174	14

Source: Derived from International Wheat Council, World Wheat Statistics, annual issues, 1976/77 to 1985/86.

The same patterns in column (5) of Tables III.4, III.5 and III.6 emerge. This lends credence to the concepts involved, but the lack of precision frustrates the legitimate use of this type of data to assess the values entering the Canadian Wheat Board wheat pool. The relationship does, however, indicate that the imprecision

may be found in the ocean freight rates rather than in the f.o.b. prices. These f.o.b. prices are Canadian Wheat Board asking prices plus terminal charges. This is an indication that the Canadian Wheat Board asking prices are reasonable approximations of transaction prices.

A final complication to this kind of transportation cost modelling in a Canadian setting is that the wheat pool is priced basis Thunder Bay and Vancouver. This means that the costs of moving grain from Thunder Bay to St. Lawrence ports, which will be discussed later and shown to have a range of imprecision, would also have to enter the model.

A study by Transmode Consultants Inc. (1988) provides an analysis of ocean shipping costs under different market conditions. Table III.8 summarizes parts of this work, providing ocean freight and handling charges to common grain importing nations from both Vancouver and Quebec City. The Quebec City and Vancouver prices are an annual average for 1985/86; while addition of lake freight and handling charges to the Quebec City price yields a Thunder Bay basis.

TABLE III.8

A COMPARISON OF WATER SHIPPING COSTS FROM VANCOUVER, QUEBEC CITY AND THUNDER BAY TO SELECTED DESTINATIONS, 1985/86

$Can/tonne, Wheat

Destination	via Vancouver	via Quebec City	via Thunder Bay *	Vancouver over Quebec City	Vancouver over Thunder Bay
Antwerp	22.18	10.71	34.33	(11.47)	12.15
Eastern USSR	21.37	44.71	68.33	23.34	46.96
Western USSR	29.73	11.91	35.53	(7.82)	5.80
Eastern Europe	27.55	16.97	40.59	(10.58)	13.04
Middle East	38.59	21.91	45.53	(16.68)	6.94
South America	24.36	14.68	38.30	(9.68)	13.94
Asia	14.31	33.57	57.19	19.26	42.88

* The Thunder Bay-Quebec City lake costs including transfer costs are $23.62/tonne.

SOURCE: Derived from Canada Grains Council, 1985/86, Canadian Grains Industry Statistical Handbook and Transport Canada, 1988, Analysis of Grain Shipping Costs and Rates.

Several observations stem from this table. First, grain originating in Vancouver is ocean freight cost competitive with exports from Quebec City going only to Eastern USSR and Asia. However, Vancouver has an advantage over Thunder Bay to all destinations. This may be part of the reason west coast prices can be higher than those for grain offered in Thunder Bay. Analysis in the following chapter indicates that grain exports are made on all of the

above routes, with the exception of the Thunder Bay/Quebec City to Asia mode.

In summary, derivation of f.o.b prices using c.i.f. net of ocean freight costs is intellectually appealing. However, because the relationships between f.o.b, ocean freight and c.i.f. using annual average data are not correlated to the degree necessary to arrive at a consistent and precise linkage that exclude intra-year fluctuations; it presents a number of practical obstacles. It is notable, however, that while this simple modelling does not yield a precise relationship, the imprecision is confined to within a range of ten percent in terms of producer returns of the value of the movements. The preceding analysis indicates that this simple modelling is conceptually sound but that the range of error is too large for use in estimating producer returns.

C.4 "EXPORTS BY COMMODITY" - CUSTOMS DATA

Studies by Gilmour and Fawcett 1986 and 1987, and the Canada Grains Council 1989 have used the derived prices from the Statistics Canada monthly publication Exports By Commodity as a source of grain prices. This publication summarizes monthly exports and their value by both commodity and export terminal. Unfortunately, in the case of grain exports, data are not segregated by grain grade. The information is gathered from official customs documents but

may be suspect in that many of the transactions are not at "arm's length". There may be reasons that a grain company, acting as an agent for the Board, does not wish to declare the actual market value of grain; for Customs purposes, either in Canada or at the port of importation, it may declare a different value. An example of this might be where an international grain company chooses in which country to pay taxes on profits by manipulating the declared import and export values of grain. Alternatively, the importing country may have an ad valorem duty which could induce the importer to understate the value of the grain on Canadian Customs documents used to assess the value of the grain for this purpose.

The use of Exports By Commodity allows the researcher to establish the value of wheat that was exported from each of several export terminals in any given month. It is a gross value that includes f.o.b. charges. Since f.o.b. charges can be reasonably ascertained, it is possible to use these data to estimate the monthly average price of export grains at each export location.

While this value is interesting, the grouping of all grades of wheat into a common wheat category makes it impossible to establish the value of a given grade at various terminals. The Canada Grains Council 1989 imposed monthly grade proportions from data provided by the Canadian Grain Commission. Presumably by a process of iteration and

the use of grade price differentials, Canada Grains Council was able to calculate grade prices at the different locations. Unfortunately, this information was not presented in its study. Instead, for the purposes of establishing the price hinterland or catchment basins of prairie grain exports, this report used the monthly average price for all wheat. Elsewhere in its report, Canada Grains Council analyzed grain exports by grade by terminal and found that, in the case of wheat, that the proportion of each grade sold at different Canadian export terminals is not the same. The report points out that the movement of specific grades through each terminal is probably a function of the market and of buyer's desires. The average grade proportions through eastern and western terminals in the period 1983/84 to 1986/87 are presented below.

TABLE III.9

GRADE ANALYSIS BY EXPORT DIRECTION OF WHEAT - AVERAGE 1983/84 TO 1986/87

Grade	Pacific	East
1 CWRS	42.3%	52.1%
2 CWRS	12.0%	14.8%
3 CWRS	31.4%	12.7%
Others	14.3%	19.4%

SOURCE: Calculated from Canada Grains Council, 1989, Factors Influencing the Direction of Export Grain Movement in Western Canada.

The skewness in grade proportions indicates that the large share of 1 CWRS movements through eastern terminals and the large share of lower valued 3 CWRS through Pacific terminals suggests a distortion of the average value of wheat as presented by Exports By Commodity. If the average grade price differentials paid by the Canadian Wheat Board are used to weight these sales [2], the average eastern price was elevated by almost 7 percent in this period.

C.5. SELECTION OF PRICE SERIES

The preceding analysis of the four alternatives for selecting a price series that is representative of export wheat prices indicates that they all have weaknesses. The correlation between American transaction prices and Canadian Wheat Board asking prices is reasonably strong; yet it is sufficiently imprecise to limit the use of American export prices as approximations of Canadian transaction prices. The most disturbing feature of the correlation is the apparent trend of the American west coast premium to narrow while the Canadian price differential may be widening. Some influences on this may be: a) different domestic transportation costs in the US; b) the effect of ocean shipping rates at alternative export ports in the US;

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[2] Calculated using grade price spreads from the wheat pools for the period 1983/84 to 1986/87. The grade prices were the final prices obtained from Canadian Wheat Board, Annual Report, 1983/84 to 1986/87 issues.

c) different agricultural policy settings that effect grain production and prices; and d) the price effect of market power at different continental export terminals. These factors suggest that 1 DNS prices at spatially comparable American ports are not reasonable estimations of Canadian transaction prices for the purposes of this analysis. While the Canadian Wheat Board may be forced to competitively price wheat for the reasons noted above, this competitive relationship with American wheat may be fluid over time.

Similarly, the examination of ocean shipping costs is frustrated not only by their variability over time but also by the small number of locations where reliable c.i.f. prices are posted. The information existing in Exports By Commodity has the failing of aggregation in that it is not sufficiently discrete to yield useable data for this study.

This suggests that use of Canadian Wheat Board asking prices may be best suited for the purposes of this analysis. While they are not transaction prices, Canadian Wheat Board asking prices are spatially and temporally comprehensive for wheat. One of their advantages is that they are publicly available. The major disadvantage is the danger that the relationship between the asking and the actual prices at different terminals is not constant either spatially or temporally. The temporal problem can be partly overcome by averaging the daily asking prices over time. This reduces the influence of short-term aberrations in the spread

between the asking and actual price between ports. The possibility that the spread between the asking and actual price at eastern ports is different than at Pacific terminals is a concern. The relationship exhibited by the Canadian Wheat Board asking prices and spatially comparable American wheat prices in Figure III.1 (p 44) demonstrates that the asking prices have maintained a reasonable relationship with nearby American prices over time.

D. ANALYTICAL PROCESS - PRICE SERIES ANALYSIS

As the objective of the first phase of the analysis is to demonstrate the existence, development and magnitude of the west coast premium, it is necessary to match the volumes of grain that receive the premium to the premium itself. By multiplying the difference between monthly average Canadian Wheat Board asking prices [3] at Pacific and Thunder Bay terminals by the monthly volume of wheat exported from the western ports of Vancouver and Prince Rupert, it is possible to establish the gross monthly value that the apparent west coast premium adds to the wheat pool. Aggregating the

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[3] F.o.b. prices could be used as a common pricing location in the marketing system. They have the advantage of being the value that enters the wheat pool. However the published f.o.b. prices are CWB asking prices plus f.o.b. charges. It is assumed that f.o.b. charges at all export locations are essentially the same. Some authors have speculated that this may not be the case. The Canadian Grain Commission regulates the maximum tariffs that grain companies may charge at terminals.

monthly value by crop year generates a gross crop year value.

E. ANALYTICAL PROCESS - DOMESTIC TRANSPORTATION COSTS

The second phase of estimating the costs to western prairie wheat producers of participating in the Canadian Wheat Board pool is to establish the costs that are associated with moving the grain east from Thunder Bay to its ultimate export port. The transportation and handling sector is largely private and is under no compulsion to reveal the actual costs involved in moving and handling grain. In such instances, suitable proxies or best estimates of the pricing and costs of the grain industry are the only available data for study. The Canadian Grain Commission, the Livestock Feed Board of Canada and the Grain Transportation Agency monitor, and in some cases, regulate this sector.

Two situations must be examined. The first is to assume that the Canadian Wheat Board is able to pass on the domestic transportation and handling costs to its customers such that the difference in price f.o.b. St. Lawrence or Atlantic to f.o.b. Thunder Bay is a fair estimate of this cost. This methodology assumes that there are no extra costs borne by pool participants for grains that are exported at points east of Thunder Bay because the Board is able to fully capture these costs in increased prices.

The second situation accommodates the possibility that these shared eastern transportation and handling costs may be more or less than the increase in price that the Board asks for grain basis St. Lawrence or Atlantic ports over Thunder Bay. If these transportation costs are less than the actual price differential, the Canadian Wheat Board is capturing an added value in the domestic transportation sector. Alternatively, if the Board cannot cover the costs of transportation and handling with discriminating pricing at St. Lawrence and Atlantic terminals, the difference between the costs and the price received represents a loss to the pool. This situation is worthy of further investigation.

These eastern movements may be necessary for the Board to satisfy the volume aspect of its mission of selling as much grain as possible at competitive prices. The capacity of the west coast terminals is less than the volume of grain offered by producers for export [4]. Groenewegan 1986 estimated the west coast capacity as 12.5 million tonnes annually. Dunlop and Lerohl 1987 refer to Canadian Wheat

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[4] While producers do not in fact offer grain for sale to the CWB which in turn attempts to find a market for it, the Board does conduct extensive surveys to establish the volume of grain produced on the prairies which allows it to estimate, after accounting for domestic consumption, the volumes that are available for export. The Board, with this estimate, finds markets and calls the grain forward into the export marketing chain by use of its quota delivery system as markets and sales opportunities warrant.

Board sources which indicate that west coast capacity may be as high as 20 million tonnes. A number of authors have speculated that this capacity constraint can be relieved by greater labour and handling efficiencies at the western export terminals. Greater railway handling efficiencies have occurred in recent years, including double tracking and grade reductions in the mountain passes. In the 1987/88 crop year, which set a new Canadian grain export record, 13.016 million tonnes were exported via Vancouver and 3.960 million tonnes via Prince Rupert; this totals 16.976 million tonnes or 53.61 percent of total Canadian grain exports[5].

Grain exports from Thunder Bay follow three basic patterns. The first is the so-called Thunder Bay direct route whereby ocean-going vessels load completely at Thunder Bay and navigate the Great Lakes/St. Lawrence Seaway System (GL/SLSS) en route to their final destination. A variation of this is that a partial cargo may be taken on at Thunder Bay with the vessel topped off at lower St. Lawrence ports. The size of the ship are limited by the size of the locks and the draft of the vessel in the Great Lakes/ St. Lawrence Seaway System. Compared to other routes, little wheat is exported this way.

The second route involves moving the grain by laker vessel to Georgian Bay ports; it is then put onto rail cars

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[5] Canada Grains Council, 1988/89, Canadian Grains Industry Statistical Handbook.

and moved to Atlantic ports, primarily Halifax and St. John, for transfer to ocean-going vessels. The Canadian Wheat Board administers and pays for the transfer of the grain on this route. The costs are deducted from the proceeds of the pool. The Canadian Wheat Board keeps its books net of Thunder Bay so that actual costs downstream of this point do not appear in public records. In order of movement f.o.b. Thunder Bay eastward the system costs are; lake freight; inward elevation; storage and outward elevation at the Bay ports; rail freight; and inward elevation, storage and outward elevation at the Maritime port.

Shipments on this Atlantic route received 1989 a favourable rail freight subsidy called the "At & East" rates [6] until 1989. Grain and flour destined for export were entitled to this rate whereby the grain transportation cost paid by the shipper (Canadian Wheat Board on behalf of the pool) was frozen at the 1960 compensatory [7] rate and the

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[6] The At & East rates were created in 1966 to allow the CWB to compete in terms of railway costs from Bay ports to Atlantic ports with competitive American railway grain shipments from Buffalo to the ports of New York, Boston and Portland, Maine. Since that time, American railway rates have increased, whereas the At and East subsidy has remained frozen. As of July 15, 1989, the At & East rates no longer apply. The federal government will therefore be offering no overt grain transportation assistance east of Thunder Bay.

[7] The term "compensatory" has a special meaning when referring to Canadian railway costs. Under the National Transportation Act, compensatory costs are defined as variable costs. Total costs, which include a charge for such capital costs as the amortization of the costs of the rail bed and rolling stock, are excluded from compensatory rates.

flour rate was frozen at the 1966 compensatory rate. This means that until 1989, wheat moved from the Georgian Bay ports to Halifax for $5.41 per tonne. In 1984/85, 380,489 tonnes of wheat were moved under the At & East rates at a cost to the federal government of $8.351 million (Federal Public Accounts). This indicates a subsidy of $21.95 per tonne in that year. Rail costs would therefore be about $26.36 per tonne. The At & East rate allowed the Atlantic route to be domestically competitive with the third route; that being export from lower St. Lawrence River terminals.

The third traffic pattern for the eastern export of Canadian Wheat Board grains, which is the most heavily used, is the St. Lawrence route. In this route, a fleet of lake freighters moves the grain from Thunder Bay via the Great Lakes/St. Lawrence Seaway System to tidewater ports in the lower St. Lawrence River [8]. These ports are from Montreal downstream. The more inland ports do not enjoy the draft of the more easterly ports, which limits the size of vessel that can be loaded.

The compilation of the costs incurred by the Canadian Wheat Board in moving grain eastward reveals some inconsistencies. Four major sources were used to gather these data. A summary of this research, lists the costs of moving wheat f.o.b. Thunder Bay to f.o.b. export terminals

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[8] These ports are Montreal, Sorel, Trois Rivieres, Quebec City, Port Cartier and Baie Comeau.

at St. Lawrence or Atlantic terminals, is shown in Table III.10. Each source requires some qualification.

The first source, Wintemute 1987, presents the data in the most detail. This report states that:

> "The cost components for grain transportation through the Great Lakes/St. Lawrence Seaway System for the calendar years 1975 through 1985 were developed from the records of the Canadian Wheat Board (CWB) in Winnipeg. These amounts were related to tonnages of each grain type actually shipped by companies by reference to the monthly reports of the Lake Shippers Clearance Association (LSCA). The cost of moving the three principal grains - wheat, oats and barley (rye, flax and rapeseed were excluded) was developed by weighting the costs for each grain type by the volumes actually shipped. These costs cover all aspects of the move from in-store Thunder Bay to f.o.b. vessel at the St. Lawrence River ports."

The second major source of eastern transportation costs is Canadian Wheat Board (c). These reports present shipping costs by calendar year as does the previously mentioned study. This is because the lake shipping season occurs roughly between the months of April and December. This corresponds more closely to the calendar year than to the crop year because the latter overlaps two navigational seasons. In Table III.10, the calendar year 1974 is found in the crop year 1973/74. The Canadian Wheat Board transportation cost data is lower than the other data and may understate the actual lake freight costs that appears in other sources. Alternatively, the Canadian Wheat Board data may be accurate and its lower costs may be due to preferential lake freight contracting by the Canadian Wheat

TABLE III.10

EASTERN TRANSPORTATION COSTS, WHEAT, 1973/74 TO 1986/87

CROP YEAR	(1) T Bay to St. Lawrence	(2) T Bay to St. Lawrence	(3) T Bay to St. Lawrence	(4) T Bay to St. Lawrence winter rail	(5) T Bay to St. Lawrence	(6) T Bay to St. Lawrence	(7) T Bay to St. Lawrence	(8) T Bay to Atlantic	(9) T Bay to Atlantic	(10) T Bay to Atlantic	(11) T Bay to Atlantic
SOURCE >	Wintemute	CWB [1]	CWB [2]	CWB [2]	CGE	CGISH	Average **	CWB [1]*	CWB [2]	CGE	Average
					$Can/tonne						
1973/74	-	7.21	8.27	11.73	7.90	-	7.79	10.94	-	12.32	11.63
1974/75	11.05	9.06	10.15	13.15	7.87	-	9.53	13.20	-	15.78	14.49
1975/76	11.55	9.52	10.56	13.45	11.27	-	10.73	13.55	-	15.85	14.70
1976/77	12.35	10.35	11.29	15.28	12.09	-	11.52	14.36	-	15.82	15.09
1977/78	13.58	11.09	11.84	17.26	12.86	13.87	12.65	15.08	-	16.18	15.63
1978/79	15.12	12.50	13.31	19.27	14.32	15.29	14.11	16.28	-	17.22	16.75
1979/80	18.27	14.66	15.53	23.33	17.25	17.82	16.71	18.14	20.96	19.89	19.66
1980/81	20.91	16.99	17.86	27.26	20.28	20.42	19.29	20.00	23.25	21.72	21.66
1981/82	22.45	18.83	20.64	31.28	22.18	22.60	21.34	22.28	24.36	-	23.32
1982/83	23.46	19.80	21.73	33.15	24.62	24.62	22.85	23.15	25.53	-	24.34
1983/84	23.93	20.56	22.25	36.64	25.27	25.27	23.46	24.35	26.40	-	25.37
1984/85	25.99	22.59	24.49	34.19	27.95	27.95	25.79	25.56	24.55	-	25.05
1985/86	-	21.24	25.59	34.23	33.36	30.23	27.60	24.92	27.57	-	26.25
1986/87	-	19.79	21.57	32.94	27.15	27.15	23.91	23.17	23.62	-	23.39

NOTES: [1] Eastern Transportation and Handling Charges for Wheat - Canadian Wheat Board, Annual Report, annual issues.

[2] Total Eastern Handling and Transportation Costs for Wheat - Canadian Wheat Board, Annual Report, annual issues.

* includes $5.41 for "At & East" rate

** not including (4), winter rail

SOURCES: Wintemute (1987), Canadian Wheat Board (c) (CWB), Canadian Grain Commission (b) (CGE), and Canada Grains Council (a) (CGISH)

Board. The higher costs cited in other works may be those available to the domestic grain trade.

The third and fourth sources, Canadian Grain Commission [9] and Canada Grains Council [10] are closely related but have inexplicable differences. They are fairly close in value to the Great Lakes/St. Lawrence Seaway System study. The Canadian Grain Commission figures are slightly larger than the Canada Grains Council numbers until 1981/82 and increase slightly more than that thereafter. Since the Canadian Grain Commission data covers the entire period, this data will be used as the reference cost data for the St. Lawrence route. On the Atlantic route, the Canadian Grain Commission data set is incomplete, ending in 1980/81. Therefore, the reference data for the Atlantic route will be the Canadian Grain Commission data up to 1980/81 and the Canadian Wheat Board data thereafter. These data sets have the added advantage that, with the exception of the Canadian Wheat Board data after 1980/81, they are based on the crop year.

The object of this part of the analysis is twofold: to establish the costs in moving wheat f.o.b. Thunder Bay to f.o.b. St. Lawrence and Atlantic ports and to determine the relationship between costs and prices. By matching monthly

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[9] Canadian Grain Commission, Canadian Grain Exports (CGE), annual issues

[10] Canada Grains Council Canadian Grains Industry Statistical Handbook (CGISH), annual issues

export volumes to the monthly differences between costs and prices, it will be possible to establish whether wheat sales east of Thunder Bay are a net addition to the wheat pool relative to that point.

F. ANALYTICAL PROCESS - LOCATION OF EXPORT PRODUCTION

It is impractical, although not impossible, to identify the individual producers of export grains at terminal positions. Spatial analysis must, however, use specific geographical or political boundaries to identify the margins that define the source of exported grains.

Agronomic or small geographical boundaries are appropriate for use in this kind of analysis if it is possible to identify that certain agronomic or climatic conditions dictate that cropping patterns fall into distinct geographical areas. While the agronomic and climatic conditions do limit the choice of prairie producers in their cropping decisions, economic and technological factors may be of greater influence within the bounds stipulated by soil and climate. Economic circumstances and the innovations of new technology and their rate of adoption are sufficiently widespread in the prairies to allow producers to grow a variety of crops in widely dissimilar locations. These economic and technical generalities render the choice of small geographical areas (e.g. county level) within the Canadian Wheat Board designated area inappropriate. In a

practical sense, data availability, coupled with methodological insensitivity, constrains the use of small geographic areas as production units.

Several alternatives exist. One is the use of agricultural census areas for which production data are available. Regional grain production alone, however, is not an accurate measure of the grain available for export from an area. In some areas, considerable grain production is fed locally to hogs and to beef and dairy cattle. This farm-fed or domestically consumed grain is not exported. The markets and pricing relationships for these grains are different than those exported.

Data on grain exports from each census area are not available. It is possible to calculate grain exports from grain production and livestock statistics using livestock grain consumption factors. This type of calculation assumes that the livestock grain consumption is satisfied by grain production within the census area. The resulting model might be inaccurate due to the number of assumed relationships. Agricultural census areas do, however, approximate the areal boundaries of different agricultural production environments.

It is clear that the degree of precision necessary to test the hypothesis depends on the identification of geographic areas where pooling may cause inefficient income distribution. Conceptually, the hypothesized distortion is

identified by costs and prices pursuant to export direction. Ignoring Churchill, the directions of export are east and west. The division of the prairies as a production area of export grains could therefore be made along a north-south line in the middle of the prairies that was indifferent to export direction. After all factors are properly accounted for, it is not clear, however, where this dividing line might be. Prices for grain at the respective export terminals and transportation costs, as well as the influence of pooling, cloud the issue. Fluid market conditions for all feasible agricultural commodities and an evolving transportation cost structure suggest that such a division of the production area into economically efficient catchment areas may not be static over time. This suggests the use of provincial boundaries as economic zones with a common denominator. Their use satisfies the broad geographic necessity of subdividing the prairies as a grain export region. Since the focus and impact of the respective provincial government's agricultural policy is different, aggregation of the source of export grains along provincial boundaries is suitable.

All Canadian Wheat Board wheat exports move to export terminals by rail. For the purposes of this analysis, the Canadian Grain Commission, Economics and Statistics Division, has provided confidential data entitled "Primary Elevator Shipments Derived from Terminal Elevator Receipts"

for the six crop years encompassed by 1979/80 to 1984/85. This information identifies the source and type of grain by shipping block origin, that arrived in the four general terminal locations of Vancouver (including Prince Rupert), Thunder Bay, Churchill and interior terminals. Grain shipments from shipping blocks have been aggregated by province. This analysis of export shipments by provincial origin is not available in other published records.

There is some overlap of shipping block boundaries between provinces, but it is not pervasive enough to invalidate the structure of provincial grain export production. For the purposes of this analysis, the province of Alberta will include the Peace River district of British Columbia. That area is the only portion of British Columbia that is a part of the Canadian Wheat Board designated area. A summary of this information is presented in the following tables.

TABLE III.11

EXPORT DIRECTION OF PROVINCIAL WHEAT EXPORTS, AVERAGE OF 1979/80 TO 1984/85

	Pacific	Eastern	Other	Total
Manitoba	1.91%	96.41%	1.68%	100.00%
Saskatchewan	28.00%	69.95%	2.05%	100.00%
Alberta	88.88%	11.07%	0.05%	100.00%

Source: Derived from information received from the Canadian Grain Commission.

TABLE III.12

PROVINCIAL ORIGIN OF WHEAT EXPORTS BY EXPORT DIRECTION, AVERAGE OF 1979/80 TO 1984/85

	Pacific		Eastern	
	%	000 tonnes	%	000 tonnes
Manitoba	0.91	62	28.81	3,012
Saskatchewan	40.91	2,770	66.35	6,932
Alberta	58.19	3,994	4.84	492
Total	100.00%	6,776	100.00%	10,436

Source: Derived from information received from the Canadian Grain Commission.

Several important observations can be made from Tables III.11 and III.12. First, approximately 60 percent of Pacific wheat exports originate in Alberta, constituting almost 90 percent of that province's exported wheat production. Manitoba's wheat shipments to the west are minuscule. Saskatchewan's wheat production is greater than

that of either of the other two provinces and, because of its central location between railheads, this province is a substantive participant in both eastern and western markets.

In the pool accounts presented in Canadian Wheat Board Annual Report, there is a deduction from each pool called "adverse movement"; this represents the costs paid by the Canadian Wheat Board to move grain to export ports that are not the most geographically proximate to the area of production. The cost to the Canadian Wheat Board is the rate paid by the shipper under the WGTA rate structure. It is notable that on average in this period (1979/80 to 1984/85), almost a half million tonnes of Alberta-produced wheat annually moved to eastern export locations that are in an adverse movement direction. The Alberta producer would have paid rail freight to Pacific ports and the Canadian Wheat Board, pays the extra costs of moving that grain east. There were few adverse movements from Manitoba (62,000 tonnes). Using this average period, it is possible to make the simplifying assumption that Alberta exported wheat accounts for 88.81 percent of the adverse movement freight costs to the pool. The large volume of Alberta wheat moved east may be the result of an insufficient supply of the higher grades demanded at eastern terminals in the eastern prairies. Data in Canada Grains Council 1989 indicate that eastern wheat exports are typically of a higher grade than west coast wheat exports. The Palliser

Triangle, which encompasses much of southern Saskatchewan and southeastern Alberta, is noted for its production of high grade wheat. Saskatchewan's central location in the Canadian Wheat Board designated area makes the costs of adverse movements negligible since the difference in shipper rates to either Vancouver or Thunder Bay is not large. Manitoba's adverse movements are therefor assumed to account for the remaining 11.19 percent of total adverse movement costs.

G. SUMMARY

This chapter reviewed the alternative choices in selecting an appropriate price series to validate the part of the hypothesis which tests the proposition that wheat prices are higher at west coast than at eastern export terminals. Canadian Wheat Board asking prices are the series of choice, primarily for their accessibility, but also because intra-port bias in the series is not evident. By multiplying the difference between monthly average Canadian Wheat Board asking prices at Pacific and Thunder Bay terminals by the monthly volume of wheat exported from the western ports of Vancouver and Prince Rupert, it is possible to establish the gross monthly apparent west coast premium that Pacific shipments add to the wheat pool. Grouping the monthly value by crop year generates a gross annual apparent premium.

This chapter has reviewed the common wheat pool costs associated with moving export wheat east of Thunder Bay to export position. It also suggests that a similar method of analysis as used with the price series is appropriate.

This chapter has also presented a method of delineating the provincial source of export grains, which is necessary to quantify the extent of producer income distortion hypothesized to be occurring.

The analysis focuses solely on the wheat pool. Durum wheat is not a major Canadian Wheat Board crop. While barley is a major prairie crop, a much smaller percentage of barley (compared to wheat) is marketed by the Canadian Wheat Board because of domestic livestock feed sales. The impact of price pooling on barley therefore has a smaller effect on the net incomes of prairie grain producers.

This analysis uses f.o.b. prices wherever possible. These data are readily available. F.o.b. prices generally represent a point in the grain transportation chain where ownership changes. Since prairie producers pay only local handling and rail transport charges, f.o.b. charges and handling at each export terminal is a charge to the pool and hence to all producers as a group.

This study relies as much as possible upon published statistics concerning Canadian grain movements and prices. Data identifying the area of wheat production for export from the Canadian Grain Commission is used to suit the

analysis and to preserve its confidential nature. Similar, but more general, information on the location of grains production is available in other public documents. The decision to use the confidential data was based on its suitability for building a factual situation in a manner to test the hypothesis. Canada Grains Council 1989 also uses a modification of the same Canadian Grain Commission data.

IV. ANALYSIS

A. INTRODUCTION

This chapter provides a time series numerical analysis of the values that enter the Canadian Wheat Board wheat pool as a function of the export terminal from which the wheat is exported. The primary pooled marketing value analyzed is the west coast premium, which is the apparent difference in price for grain of equal quality and type between the geographic locations at which grain is valued entering the Canadian Wheat Board pools. Wheat revenues enter the pool basis Thunder Bay and Vancouver. The net values of commonly shared transportation, handling and prices entering the wheat pool, which are functions of eastern wheat exports and the costs of adverse movement, are likewise analyzed. The analysis attributes these values to the respective prairie province where these shipments originated. This allows a contrast between this income distribution and the existing income distribution resulting from the current Canadian Wheat Board pooling.

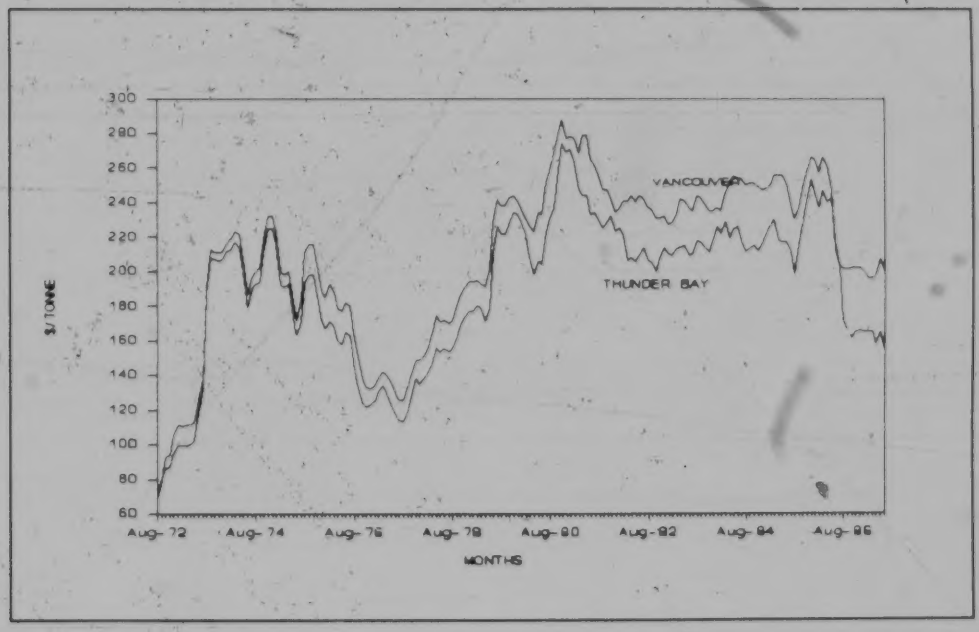
B. WEST COAST PREMIUM

B.1 PRICES

The previous chapter presented the rationale for using Canadian Wheat Board quoted or asking prices as a price series. An appreciation for the price differences between Thunder Bay and Vancouver can be graphically shown. Figure IV.1 shows monthly average Canadian Wheat Board asking prices for 1 CWRS 13.5%, basis Thunder Bay and Vancouver for the crop years 1972/73 to 1986/87. Figure IV.2 presents these prices averaged on an annual basis for the same period, locations and grain. These price series make it apparent that west coast prices were higher than those offered at Thunder Bay throughout the period. The trend observed in both figures was that the premium offered at Pacific ports increased over time.

FIGURE IV.1

AVERAGE MONTHLY CANADIAN WHEAT BOARD ASKING PRICES, 1972/73 TO 1986/87

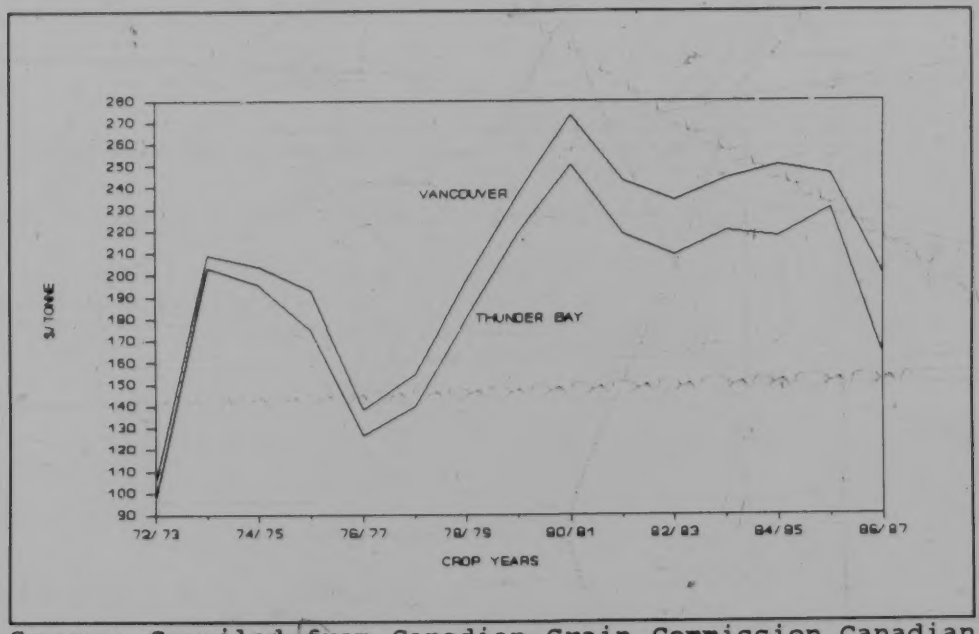


Note: 1 CWRS 13.5%

SOURCE: Compiled from Canada Grains Council, Canadian Grain Exports, Annual issues, 1972/73 to 1986/87.

FIGURE IV.2

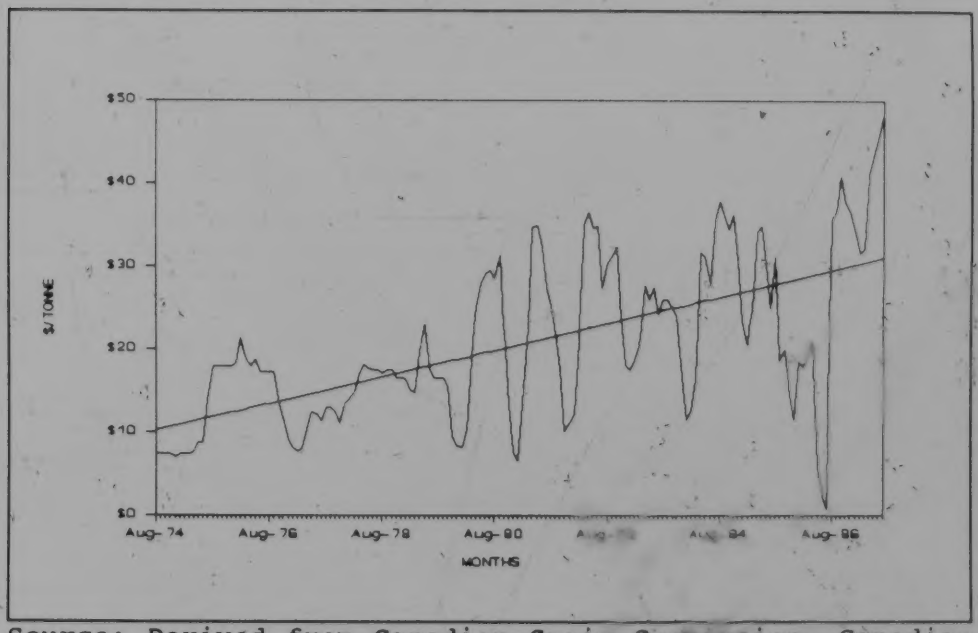
ANNUAL CANADIAN WHEAT BOARD ASKING PRICES, 1 CWRS 13.5%, 1972/73 TO 1986/87



Source: Compiled from Canadian Grain Commission, Canadian Grain Exports, Annual Issues, 1972/73 to 1986/87.

FIGURE IV.3

VANCOUVER MINUS THUNDER BAY CANADIAN WHEAT BOARD ASKING PRICES, 1 CWRS 13.5%, MONTHLY, 1974/75 TO 1986/87



Source: Derived from Canadian Grain Commission, Canadian Grain Exports, Annual Issues, 1974/75 to 1986/87

Figure IV.3 is a refinement of Figure IV.1; it shows the monthly difference in prices offered by the Canadian Wheat Board for 1 CWRS 13.5% and plots a trend line of apparent growth in this difference. The trend line has a positive slope of $0.13 per tonne per month or $1.61 per year over the charted period. There is substantial variation in the monthly difference in prices between Thunder Bay and Vancouver, ranging from less than $1 per tonne in July of 1986 to over $47 per tonne a year later.

The major aberration in 1985/86 was due to the global fall in wheat prices brought on by aggressive grain marketing actions by the United States and the European Community. It is worth noting that in the last quarter of the 1985/86 crop year, labour problems impeded eastern exports. The Canadian Wheat Board may have been using high eastern prices to ration its limited export capacity during this time, thereby narrowing the difference between the two price series.

In the 182 monthly observations in the 1972/73 to 1986/87 period, the apparent west coast premium was always positive. In fact, the last time Thunder Bay prices exceeded Pacific prices was in September 1970 when it was $0.46 per tonne [1] higher. Regression analysis on the

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[1] Canadian Grain Commission 1970/71, Canadian Grain Exports.

monthly price observations at Thunder Bay and Vancouver show that they are different [2] with a confidence level of .01. This is a statistical indication of the existence of a price difference between the two ports.

The monthly variation in the difference between the two price series has an apparent pattern. In the winter months, when the Great Lakes/St. Lawrence Seaway System was closed, the difference narrowed. It is difficult to say whether the Thunder Bay price rises in relation to the western price or vice versa since both price series were active. Because winter rail movements are more expensive than summer water movements [3], the Canadian Wheat Board could have been practising a pricing policy whereby when the Great Lakes/ St. Lawrence Seaway System was closed, the asking prices at eastern locations could have been elevated to ration eastern exports.

Figure IV.4 is a presentation of the average monthly apparent west coast premium averaged over the period 1974/75 to 1986/87. The average monthly premium is highest in the early spring after the Great Lakes/St. Lawrence Seaway System opens and smallest in the winter months when it is closed. The volume of eastern grain exports exhibits much

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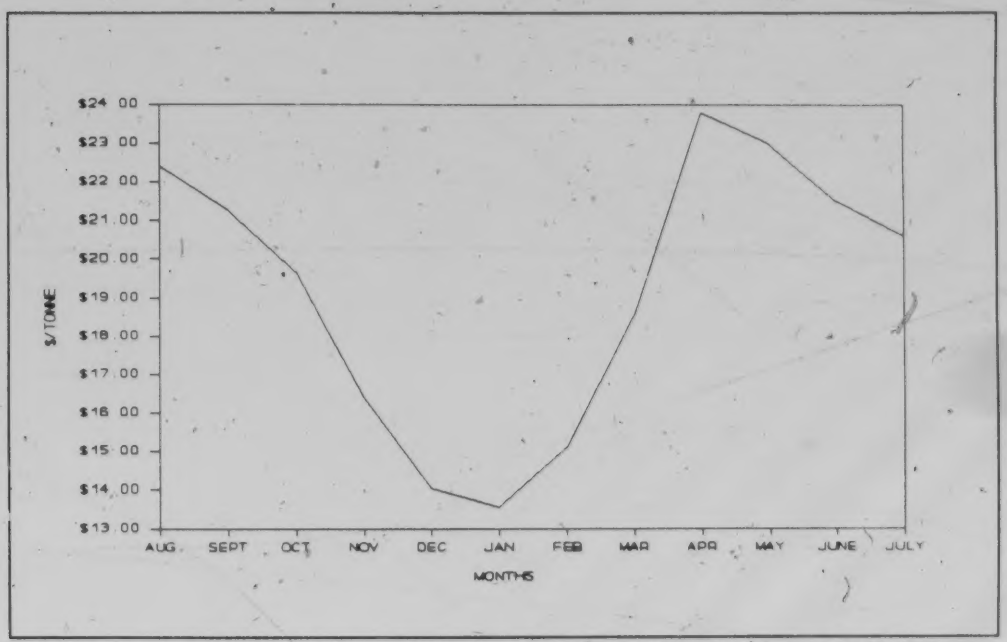
[2] The constant (A) in the standard regression equation $y = A + Bx$, was not zero, using a t-test.

[3] See Table III.10, Eastern Transportation Costs, Wheat, 1973/74 to 1986/87, p 68, columns 3 and 4, for these costs.

FIGURE IV.4

AVERAGE MONTHLY DIFFERENCE IN ASKING PRICES, VANCOUVER MINUS THUNDER BAY, 1 CWRS 13.5%, AVERAGED OVER 1974/75 TO 1986/87



Source: Derived form Canada Grains Council, 1974/75 to 1986/87, Canadian Grains Industry Statistical Handbook

the same pattern as the shape of the line in this figure, falling in the winter months and peaking shortly after the opening of the Great Lakes/St. Lawrence Seaway System. This is offered as a partial explanation of the monthly variation in the apparent west coast premium. When the Great Lakes/St. Lawrence Seaway System is closed, the Canadian Wheat Board may narrow the bid price spread between eastern and western terminals to favour western exports and/or to discourage sales from eastern terminals. The amount by

which the spread narrows (on average about $10 per tonne) is an approximation of the difference in transportation and handling costs between when the St. Lawrence Seaway is open and when it is closed. During this period, the minimum average monthly premium was almost $14 per tonne while the maximum was almost $24 per tonne.

B.2 PACIFIC VOLUMES

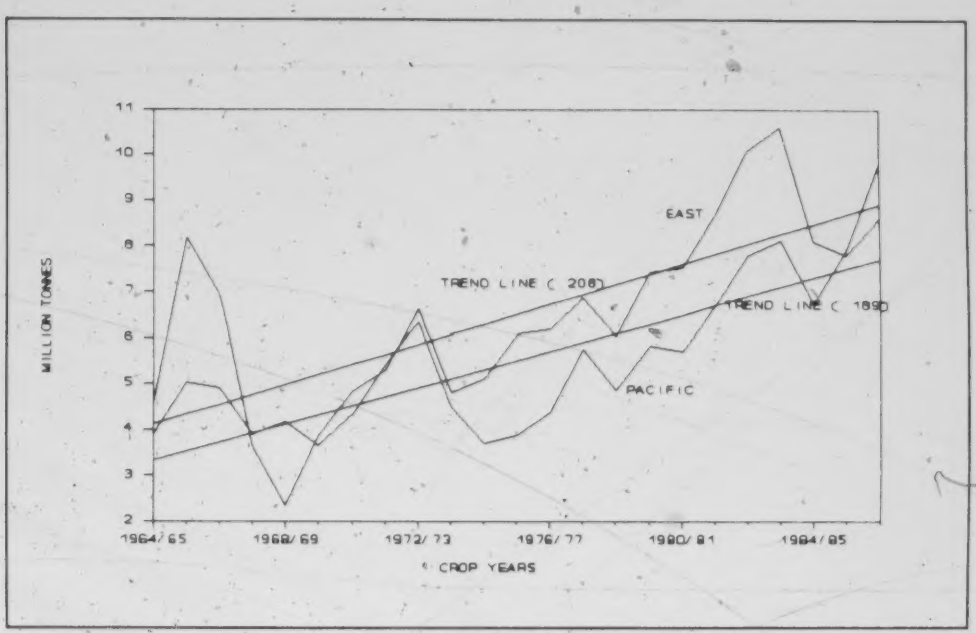
The trend lines illustrated in Figure IV.5 show eastern wheat exports growing at an annual rate of 208,000 tonnes and Pacific wheat exports at a slightly lower rate of 189,000 tonnes per year. The trend lines are very sensitive to the years that are included in the regression. If, for example, only the last decade were examined (1976/77 to 1986/87), the Pacific growth rate for wheat exports would exceed the eastern growth rate.

It should be noted that the R^2 of the regression equations that express the position of the trend lines are low indicating weak explanatory significance for the equations. Canada Grains Council 1989 used the period 1977/78 to 1986/87 to analyze clearance sector export shares for all grains. The report concluded that the Pacific rate of growth was 680,000 tonnes per year while the Thunder Bay growth was 250,000 tonnes per year. The report also noted that, when expressed in percentage terms, 1985/86 was the first year that total Pacific grain exports exceeded those

from eastern ports.

FIGURE IV.5

CANADIAN WHEAT EXPORTS, 1964/65 TO 1986/87



Source: Canadian Grain Commission, 1964/65 to 1986/87, Canadian Grain Exports

B.3 VALUES ADDED TO THE WHEAT POOL - WEST COAST PREMIUM

To assess the gross value that the west coast premium added to the wheat pool, the matching wheat prices with export sales volumes can be done on either an annual or a monthly basis. Since there appears to be a pattern of monthly variation in the difference between the Thunder Bay and Vancouver 1 CWRS prices, both methods lend themselves to

examination.

Table IV.1 is a presentation of the values added to the wheat pool by the west coast premium. The price differential between Vancouver and Thunder Bay is matched with Pacific export volumes to generate these figures and uses both annual and monthly price and volume data. With the notable exception of 1985/86, there is little difference between either method of calculation. The marked difference between the two figures in 1985/86 ($329.964 million annually and $213.346 million monthly) is partly explained by large Pacific movements in the last quarter of that crop year when labour problems at eastern terminals and the international grain market turmoil noted previously caused a narrowing of the premium. When calculated on a monthly basis, these factors deflated the annual added value to the wheat pool by the west coast premium. The normal east-west wheat price trend resumed in 1986/87.

Subsequent analysis in this study will use the apparent west coast premium calculated on a monthly basis since it reflects temporal variations in the value of the premium more accurately.

TABLE IV.1

VALUE OF THE WEST COAST PREMIUM, WHEAT, 1970/71 TO 1986/87

Crop Year	Pacific Volume (000 tonnes)	Vancouver Minus Thunder Bay Price Annual Basis ($/tonne)	Pacific Volume Times Price Difference Annual Basis ($000)	*Pacific Volume x Price Difference Monthly Basis ($000)
1970/71	4,321	0.87	3,759	2,536
1971/72	5,422	3.13	16,971	12,197
1972/73	6,347	9.00	57,124	54,477
1973/74	4,486	5.70	25,520	25,783
1974/75	3,695	8.13	30,449	29,561
1975/76	3,872	18.33	71,031	71,317
1976/77	4,372	11.57	49,098	51,735
1977/78	4,755	14.99	72,367	86,145
1978/79	4,849	17.40	85,391	84,366
1979/80	5,833	18.00	114,786	108,328
1980/81	5,689	22.85	138,328	129,899
1981/82	6,696	23.99	170,387	161,238
1982/83	7,785	24.86	191,418	193,976
1983/84	8,104	23.74	199,132	192,494
1984/85	6,729	37.74	253,952	281,293
1985/86	7,892	41.81	329,964	213,346
1986/87	9,793	41.16	403,224	425,185

Note: In March 1985, the Canadian Wheat Board ceased quoting asking prices basis Thunder Bay. Therefore the Thunder Bay price for 1984/85 to 1986/87 is St. Lawrence net of water movement costs from Thunder Bay. These costs are : 1984/85 - $27.95, 1985/86 - $33.36, and 1986/87 - 27.15.

Sources: Derived from International Wheat Council, 1970/71 to 1986/87 International Wheat Statistics, Statistics Canada, 1970/71 to 1986/87, Grain Trade Of Canada, Canadian Grain Commission 1970/71 to 1986/87, Canadian Grain Exports, Canada Grains Council 1970/71 to 1986/87, Canadian Grains Statistical Handbook.

C. EASTERN TRANSPORTATION AND HANDLING COSTS

Tables IV.2 and IV.3 generate the annual difference in value between eastern transportation costs, and the premium (price increase over costs) the Canadian Wheat Board commands at St. Lawrence and Atlantic terminals over Thunder Bay. The decision to use annual data was made for several reasons. The first is that wheat sales were not made at Atlantic terminals every month even though asking prices were published every month. Further, analysis of the west coast premium indicated that there was little difference between a directly calculated annual value and one calculated from monthly price differences matched with monthly export volumes. The right hand column (5) in both tables represents the annual value per tonne by which the difference in locational pricing exceeds the transportation and handling costs. The transportation and handling costs that underlie this analysis (column (1)) are those found in Canadian Grain Exports, as summarized in Table III.10 (p 68).

It should be noted that the transportation and handling costs published by the Canadian Wheat Board have been lower than the Canadian Grain Commission figures by up to $12.12 per tonne (in 1985/86). In the past, the Board has negotiated long-term lake freight contracts that may have significantly lower per tonne costs than those available to the domestic grain trade reported in Canadian Grain Exports.

This may indicate that the Canadian Wheat Board is capturing a price premium in excess of transportation and handling costs between Thunder Bay and St. Lawrence or Atlantic ports. Examination of Canadian Wheat Board transaction data would be necessary to validate that hypothesis. The data analyzed in the following tables uses publicly available data. The analysis demonstrates that the annual net added value to the wheat pool by sales at St. Lawrence and Atlantic terminals over the prices at Thunder Bay, calculated on a per tonne basis, is negative.

TABLE IV.2

ST. LAWRENCE TRANSPORTATION AND HANDLING COSTS AND THE APPARENT ST. LAWRENCE PREMIUM, 1973/74 TO 1986/87

$Cdn/tonne

	(1) Total Cost in-store T Bay to St. Lawrence	(2) Thunder Bay f.o.b. Charges	(3) Net Cost To St. Lawrence (1) - (2)	(4) St. Lawrence Premium	(5) Premium minus Net Cost
1973/74	7.90	1.80	6.10	6.08	(0.02)
1974/75	7.87	2.05	5.82	7.58	1.76
1975/76	11.27	2.26	9.01	8.67	(0.34)
1976/77	12.09	2.57	9.52	9.50	(0.02)
1977/78	12.86	2.64	10.22	10.08	(0.14)
1978/89	14.32	3.01	11.31	10.92	(0.39)
1979/80	17.25	3.48	13.77	12.83	(0.94)
1980/81	20.28	3.77	16.51	15.00	(1.51)
1981/82	22.18	4.02	18.16	17.00	(1.16)
1982/83	24.62	4.67	19.95	18.50	(1.45)
1983/84	25.27	4.90	20.37	18.67	(1.70)
1984/85	27.95	5.01	22.94	19.50	(3.44)
1985/86	30.23	5.24	24.99	21.42	(3.57)
1986/87	27.15	5.24	21.91	20.92	(0.99)

Note: Column (1) from Table III.10 Column (5) p 68.
Column (4) St. Lawrence minus Thunder Bay 1 CWRS 13.5% Canadian Wheat Board official in-store prices converted to f.o.b. at current fobbing rates.
In March 1985, the Canadian Wheat Board ceased quoting asking prices basis Thunder Bay. Therefore the Thunder Bay price for 1984/5 to 1986/87 is St. Lawrence net of water movement costs from Thunder Bay. These costs are : 1984/85 - $27.95, 1985/86 - $33.36, and 1986/87 - 27.15. (Canadian Grain Commission (a))

Sources: Derived from Canadian Grain Commission 1973/74 to 1986/87, Canadian Grain Exports, International Wheat Council 1973/74 to 1986/87, International Wheat Statistics and Table III.10 p 68

TABLE IV.3

ATLANTIC TRANSPORTATION AND HANDLING COSTS AND THE APPARENT ATLANTIC PREMIUM, 1973/74 TO 1986/87

$Cdn/tonne

	(1) Total Cost in-store T Bay to Atlantic	(2) Thunder Bay f.o.b. Charges	(3) Net Cost To Atlantic	(4) Atlantic Premium	(5) Premium minus Net Cost
1973/74	12.32	1.80	10.52	9.50	(1.02)
1974/75	15.78	2.05	13.73	11.92	(1.81)
1975/76	15.85	2.26	13.59	13.00	(0.59)
1976/77	15.82	2.57	13.25	13.25	0.00
1977/78	16.18	2.64	13.54	14.58	1.04
1978/89	17.22	3.01	14.21	15.08	0.87
1979/80	19.89	3.48	16.41	16.83	0.42
1980/81	21.72	3.77	17.95	18.83	0.88
1981/82	24.36	4.02	20.34	20.50	0.16
1982/83	25.53	4.67	20.86	21.33	0.47
1983/84	26.40	4.90	21.50	21.92	0.42
1984/85	24.55	5.01	19.54	23.33	3.79
1985/86	27.57	5.24	22.33	24.83	2.50
1986/87	23.62	5.24	18.38	24.25	5.87

Note: Column 1 from Table III.10, p68. For 1973/74 to 1980/81, Column 1 and Column 2 for 1981/82 to 1986/87.

Column 4 Atlantic minus Thunder Bay, 1 CWRS 13.5%, Canadian Wheat Board official in-store prices converted to f.o.b. at current fobbing rates.

Sources: Derived from Canadian Grain Commission 1973/74 to 1986/87, Canadian Grain Exports, International Wheat Council 1973/74 to 1986/87, International Wheat Statistics and Table III.10 p 68

Regression analysis of the time series pricing premium between both eastern export locations and Thunder Bay and the costs of transportation and handling shows that they are not equal with a confidence level of .01.

It is worth noting that the net value (increased price minus costs) of Atlantic shipments (Table IV.3) adds to the total value of the pool; however, the losses from St. Lawrence exports more than offset this value. In the period analyzed, the Atlantic exports benefitted from the At & East rail transportation rates. The At & East assistance ended as of July 15, 1989. It is unclear whether grain exports will continue to be made from Atlantic ports in the absence of the At & East assistance.

Net added value is calculated as the apparent annual price difference, minus the costs of transportation and handling (column 5, Tables IV.2 and IV.3), multiplied by the annual volume exported from each eastern terminal.

TABLE IV.4

SUMMARY OF NET ADDED VALUE TO THE WHEAT POOL BY EASTERN EXPORTS, 1973/74 TO 1986/87

$Cdn/tonne

	(1) Net Added value at St. Lawrence ($000)	(2) Net Added value at Atlantic ($000)	(3) Combined (1) + (2) ($000)	(4) Eastern Wheat Exports (000 tonnes)	(5) Dollars per tonne
1973/74	(84)	(489)	(573)	4,699	(0.12)
1974/75	7,151	(1,144)	6,010	4,695	1.28
1975/76	(1,792	(440)	(2,232)	6,016	(0.37)
1976/77	(109)	0	(109)	6,143	(0.02)
1977/78	(844)	739	(105)	6,741	(0.02)
1978/89	(2,138)	439	(1,699)	5,987	(0.28)
1979/80	(6,095)	262	(5,833)	7,110	(0.82)
1980/81	(10,451)	463	(9,988)	7,447	(1.34)
1981/82	(9,125)	97	(9,028)	8,473	(1.07)
1982/83	(13,659)	235	(13,424)	9,919	(1.53)
1983/84	(17,102)	145	(16,957)	10,405	(1.63)
1984/85	(25,046)	1,543	(23,503)	7,688	(3.06)
1985/86	(24,451)	1,397	(23,054)	7,408	(3.11)
1986/87	(7,746)	2,700	(5,046)	8,284	(0.61)

Sources: Derived from Canadian Grain Commission 1973/74 to 1986/87 Canadian Grain Exports and previous Tables.

Two other pooled values were considered for inclusion in the analysis but discarded. First, there is a small difference in f.o.b. charges between Pacific ports and Thunder Bay. Canadian Grain Exports, which is the reference used for the eastern transportation and handling costs, records this inter-port difference, but it has remained at less than ten cents per tonne for the past fifteen years and is therefore considered negligible.

The other pooled value that enters the wheat pool is the returns from the two-price wheat policy. Since the majority of Canada's milling capacity is in central Canada, wheat originating from the eastern prairies may have received the major benefit under this domestic pricing policy. Several factors led to the exclusion of the effect of the two-price wheat policy in this study. The first is that the two-price policy was a government instrument created to serve all wheat producers, including those outside the Canadian Wheat Board area. It was not, therefore, a result of market forces as the other marketing factors discussed here are. Another issue is that, historically, the domestic price of wheat (set by Order-in-Council) was sometimes below and sometimes above the international prices the wheat pool received from export sales. A final reason for not including this factor in this analysis is that, as of June 1988, the policy was phased out and wheat for domestic human consumption became, by and

large, priced competitively at international levels.

D. RETURNS TO PRODUCERS

Table IV.5 is a summary of the three factors entering the wheat pool that are primarily due to the location of marketing: the apparent west coast price differential; the cost of handling and transportation east from Thunder Bay net of the apparent price received at St. Lawrence/Atlantic terminals; and the costs of adverse movement. The adverse movement factor represents the costs borne by the Canadian Wheat Board for transporting wheat to a more distant terminal than what the producer has paid as a deduction from his initial payment. For example, the pool pays adverse movement costs when wheat from Alberta is transported to Thunder Bay. The producer pays freight to Vancouver while the pool pays (as the producer share of the WGTA costs) the costs of freight to Thunder Bay, minus what the producer has already had deducted. All three factors are commonly shared on a pro rata participation basis by all pool participants.

TABLE IV.5

SUMMARY OF POOLED VALUES, 1973/74 TO 1986/87

($Cdn 000)

	Apparent West Coast Premium	Eastern Transportation	Adverse Movement	Sum
1973/74	25,783	(573)	(1,685)	23,525
1974/75	29,561	6,010	(794)	34,777
1975/76	71,317	(2,232)	(1,132)	67,953
1976/77	51,735	(109)	(1,085)	50,541
1977/78	86,145	(105)	(2,848)	83,192
1978/79	84,366	(1,699)	(2,301)	80,366
1979/80	108,328	(5,833)	(2,452)	100,043
1980/81	129,899	(9,988)	(2,221)	117,690
1981/82	161,238	(9,028)	(1,976)	150,234
1982/83	193,976	(13,424)	(3,508)	177,044
1983/84	192,494	(16,957)	(2,423)	173,114
1984/85	281,293	(23,503)	(5,606)	252,184
1985/86	213,346	(23,054)	(8,087)	182,205
1986/87	425,185	(5,046)	(8,749)	411,390

Notes:

1. The apparent west coast premium is calculated by subtracting the average annual Thunder Bay price for 1 CWRS 13.5% wheat from the comparable Vancouver price, all multiplied by the annual Pacific export volume.

2. Eastern transportation costs are calculated by subtracting the above noted Thunder Bay price from comparable St. Lawrence and Atlantic prices, multiplied by the respective annual volumes exported from those terminals

Source: from prior tables, and for Adverse Movements, Canadian Wheat Board, 1973/74 to 1986/87 Annual Report.

Table IV.6 shows how the pooled values in the wheat pool are distributed among the prairie provinces. These data were obtained in their original form from the Canadian Grain Commission as discussed in the previous chapter and have been modified both to suit this analysis and to maintain their confidential nature. The row entitled "Current Distribution (pooled)" is an average of the crop year share by province of prairie wheat exports for the period 1979/80 to 1984/85. For example, Alberta contributed 25.99 percent of Canadian Wheat Board wheat sales in this period. The total income from Canadian Wheat Board wheat sales to Alberta was therefore 25.99 percent of the revenues distributed by the Canadian Wheat Board wheat pool in this period. The subsequent headings attribute the three pooled costs and benefits studied in this analysis by the province of origin for the wheat that contributed to these factors. For example, Alberta wheat represented 58.19 percent of west coast wheat sales in this period.

A five-year average was as a constant attribution factor, rather than actual annual attribution factors to overcome annual movement deviations caused by local supply problems. If there had been a localized drought in one area of the Canadian Wheat Board designated area in one of these years, wheat shipments from that area would have been less than normal. The use of a five-year average, weighted towards the end of the period studied, creates a normal

shipment pattern that is relevant to policy analysis.

TABLE IV.6

AVERAGE PROVINCIAL ORIGIN FACTORS FOR EXPORT MOVEMENTS, 1979/80 TO 1984/85

	Alberta	Saskatchewan	Manitoba	Total
Current Distribution -pooled)	25.99%	56.20%	17.81%	100.00%
Movement share				
West	58.19%	40.91%	0.91%	100.00%
East	4.84%	66.35%	28.81%	100.00%
Adverse Movement	88.81%	-	11.19%	100.00%

Notes: 1. Current distribution is based on average provincial exports of wheat in the period 1979/80 to 1984/85, i.e. wheat from Alberta accounted for an average of 25.99 percent of total CWB wheat exports over the period 1979/80 to 1984/85.

2. West and East are attributed by the provincial origin of wheat exported via the Pacific and eastern routes respectively, i.e. Alberta wheat exports constitute 58.19 percent of Pacific shipments and 4.84 percent of eastern shipments.

3. Adverse Movement is attributed by provincial origin and assumes that adverse movements do not occur from Saskatchewan. Grain moving under adverse movement is grain that does not move to the nearest (least cost under the WGTA) port. The pool is charged for transportation costs in excess of that paid by the producer.

Source: derived from data from the Canadian Grain Commission and for Adverse Movements, Canadian Wheat Board, 1979/80 to 1984/85, Annual Report.

TABLE IV.7

DISTRIBUTION OF POOLED VALUES, 1973/74 TO 1986/87

($Cdn 000)

	Alberta	Saskatchewan	Manitoba
1973/74	6,114	13,221	4,190
1974/75	9,039	19,545	6,194
1975/76	17,661	38,190	12,102
1976/77	13,136	28,404	9,001
1977/78	21,622	46,754	14,816
1978/89	20,887	45,166	14,313
1979/80	26,001	56,224	17,818
1980/81	30,558	66,142	20,961
1981/82	39,046	84,432	26,757
1982/83	46,014	99,499	31,532
1983/84	44,992	97,290	30,832
1984/85	65,543	141,727	44,914
1985/86	47,355	102,399	32,451
1986/87	106,920	231,201	73,269

Note: The horizontal sum of each crop year is equivalent to the sum in Table IV.5 (p 99), representing the pooled values of the west cost premium, net eastern transportation costs and the costs of adverse movement. The attribution factors are explained in Table IV.6 (p 101)

Source: Derived from previous tables.

Table IV.7 is a presentation of the net pooled values by province and is derived from the three movement factors that are pooled using the "Current Distribution" in Table IV.6. This is the distribution of the west coast premium, net eastern transportation costs and the adverse movement costs, using the five-year average movement attribution factors previously described. The apparent pattern is that Saskatchewan receives about twice the total pooled value of Alberta, which in turn is about one-third larger than the pooled values received by Manitoba. In nominal dollars, the values have grown over the 1973/74 to 1986/87 period from about $25 million to over $400 million.

Table IV.8 attributes these net pooled values for wheat by the province of origin. This distribution is much different than that noted in Table IV.7 which represented the current pooling distribution. In the distribution by province of origin, Alberta would receive approximately 60 percent of the total pooled value. Saskatchewan would receive the remaining 40 percent, while Manitoba would receive no benefit and perhaps even a small loss.

TABLE IV.8

DISTRIBUTION OF POOLED VALUES SHOULD MOVEMENT SHARES BE ATTRIBUTED BY PROVINCIAL ORIGIN, 1973/74 TO 1986/87

($Cdn 000)

	Alberta	Saskatchewan	Manitoba
1973/74	13,479	10,168	(119)
1974/75	16,787	16,081	1,912
1975/76	40,386	27,695	(121)
1976/77	29,136	21,092	318
1977/78	47,593	35,172	435
1978/89	46,967	33,387	21
1979/80	60,576	40,447	(969)
1980/81	73,132	46,515	(1,944)
1981/82	91,633	59,972	(1,355)
1982/83	109,109	70,449	(2,495)
1983/84	109,040	67,498	(3,405)
1984/85	157,568	99,483	(4,493)
1985/86	115,848	71,984	(5,605)
1986/87	239,401	170,595	(1,436)

Note: The horizontal sum of each crop year is equivalent to the sum in Table IV.5 (p 99), representing the pooled values of the west coast premium, net eastern transportation costs and the costs of adverse movement. For example, in Alberta in 1973/74: 58.19 percent of the apparent annual west coast premium of $25.783 million, plus 4.84 percent of the ($0.573) million net eastern transportation costs - a negative value in this case), plus 88.81 percent of the 1.685 million costs of adverse movement is equal to $13.479 million.

Source: Derived from previous tables.

Table IV.9 presents the significant difference between these two net benefit distributions. In Alberta, in 1986/87, maintenance of the existing pooling system allowed Saskatchewan and Manitoba to share almost equally $130 million that would have been received by Alberta wheat producers had pooled values been distributed by provincial origin.

Table IV.10 converts the net benefit distribution into a value per tonne. These values are much more significant than the values indicated in the previous tables. Compared to a pooling mechanism based on the province of origin for wheat, the maintenance of the current pooling mechanism cost the Alberta wheat producer approximately $28 per tonne in 1986/87. The Saskatchewan wheat producer would have received about $5 per tonne less had the pooling system reflected the provincial origin of wheat in the pool, and the Manitoba producer would have received almost $22 per tonne less. The current pooling system evidently disadvantages Alberta producers in favour of eastern prairie producers.

TABLE IV.9

DIFFERENCE OF POOLED VALUES BETWEEN THE EXISTING POOLING METHOD AND THE DISTRIBUTION BY MOVEMENT SHARES ATTRIBUTED BY PROVINCIAL ORIGIN, 1973/74 TO 1986/87

($Cdn 000)

	Alberta	Saskatchewan	Manitoba
1973/74	(7,365)	(3,053)	4,309
1974/75	(7,749)	(3,464)	4,282
1975/76	(22,725)	(10,495)	12,223
1976/77	(16,000)	7,312	8,683
1977/78	(25,972)	11,582	14,382
1978/89	(26,080)	11,779	14,292
1979/80	(34,575)	15,777	18,787
1980/81	(42,545)	19,627	22,905
1981/82	(52,587)	24,459	28,111
1982/83	(63,096)	29,050	34,026
1983/84	(64,047)	29,792	34,236
1984/85	(92,026)	42,245	49,753
1985/86	(68,493)	30,416	38,056
1986/87	(132,481)	60,606	71,832

Notes: 1. Horizontal addition may not sum to zero due to rounding errors.

2. This table is the subtraction of Table IV.7 from Table IV.8. Negative values indicate a loss of income by that province maintaining the existing pooling mechanism as compared to a revenue distribution based on the provincial origin of the wheat.

TABLE IV.10

EFFECT ON THE PROVINCIAL VALUE OF WHEAT IF EXPORT MOVEMENT SHARE VALUES WERE ATTRIBUTED BY PROVINCIAL ORIGIN, 1973/74 TO 1986/87

($Cdn/tonne)

	Alberta	Saskatchewan	Manitoba
1973/74	2.94	(0.56)	(2.51)
1974/75	3.39	(0.70)	(2.73)
1975/76	8.77	(1.87)	(6.88)
1976/77	5.59	(1.18)	(4.43)
1977/78	7.53	(1.55)	(6.08)
1978/89	9.16	(1.91)	(7.33)
1979/80	10.03	(2.12)	(7.95)
1980/81	12.13	(2.59)	(9.53)
1981/82	12.92	(2.78)	(10.08)
1982/83	13.29	(2.83)	(10.46)
1983/84	13.15	(2.83)	(10.26)
1984/85	23.23	(4.93)	(18.32)
1985/86	16.55	(3.40)	(13.42)
1986/87	27.71	(5.86)	(21.93)

Source: Derived from previous tables.

V. CONCLUSIONS

A. INTRODUCTION

The analysis has identified the costs and benefits of pooling by province the apparent west coast premium, the costs of eastern transportation and handling in excess of price premiums, and the costs of adverse movements. The largest shared value stemming from the pooling of net terminal receipts is the benefit due to favourable pricing at Pacific terminals compared to Thunder Bay. The costs of moving wheat to lower St. Lawrence and Atlantic terminals from Thunder Bay were approximately offset by the increased price asked for wheat at those positions. The other major shared-pooled cost in the wheat pool was the adverse movement expense, which was primarily incurred by Alberta wheat moving east. It is noteworthy that over 80 percent of durum exports (Canada Grain Exports) are from eastern terminals, which indicates that adverse movements may play a significant role in the durum pool as well.

The analysis identified the change in prices and incomes from pooling by using the provincial origin of the wheat as an income distribution factor in contrast to the existing pooled distribution of incomes. It indicated that,

with the exception of 1985/86, the added value to the wheat pool by the apparent west coast premium has shown dramatic growth every year, reaching $425 million in 1986/87. If the pooled net marketing revenues from each terminal had been divided among the prairie provinces according to provincial origin of the exported wheat, Alberta would have enjoyed an increased benefit of $132 million from the wheat pool proceeds that year. Since total Alberta wheat receipts for calendar year 1987 were $559 million (Statistics Canada Catalogue 21-603-E, Agriculture Economic Statistics, 1988), the addition of $132 million would have increased gross incomes for that province's wheat farmers by almost 24 percent. In contrast, Manitoba would have foregone a $71 million benefit from the pooling of net terminal pricing, representing a loss of 18 percent of that province's $400 million in gross wheat receipts in calendar 1987. The lost benefit of $61 million to Saskatchewan's wheat economy of $1.497 billion would have been comparatively small. It is noteworthy that the total Canadian Wheat Board payment for 1 CWRS 13.5% in 1986/87 was $133.53 per tonne and that final payments were not made for some wheat grades.[1] The per tonne values for 1986/87 calculated in the previous chapter by distributing the export movement share by province from which the wheat

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[1] Canadian Wheat Board, Grain Matters, January 1988, p 2

originated, indicated that Alberta would have enjoyed a price increase of $27.71; Saskatchewan and Manitoba would have experienced price decreases of $5.86 and $21.93, respectively.

B. CONCEPTUAL ANALYSIS

The distribution of net pooled returns to an individual wheat producer on the prairies was graphically presented in Figures II.1 and II.2 (p 26 and 28 respectively). Those figures were independent of the absolute wheat prices at Thunder Bay and Vancouver. They were based on the transportation costs that a tonne of wheat would encounter if it went either east or west for export and assume that there is an average annual price differential between the eastern and western terminals. In Figure II.1, St. Lawrence and Vancouver prices were equivalent and lake transportation and handling costs were $25.00 per tonne. In Figure II.2, the Vancouver price exceeded the St. Lawrence price by $20.00 per tonne. The slope of the lines traversing the prairies was equivalent to the WGTA rail transportation rates paid by producers (shippers). That was assumed to be $15.00 per tonne for the shipment between Thunder Bay and Vancouver. Since the producer pays rail freight to the closer of either destination, the highest rail rate a producer paid would have been $7.50 per tonne.

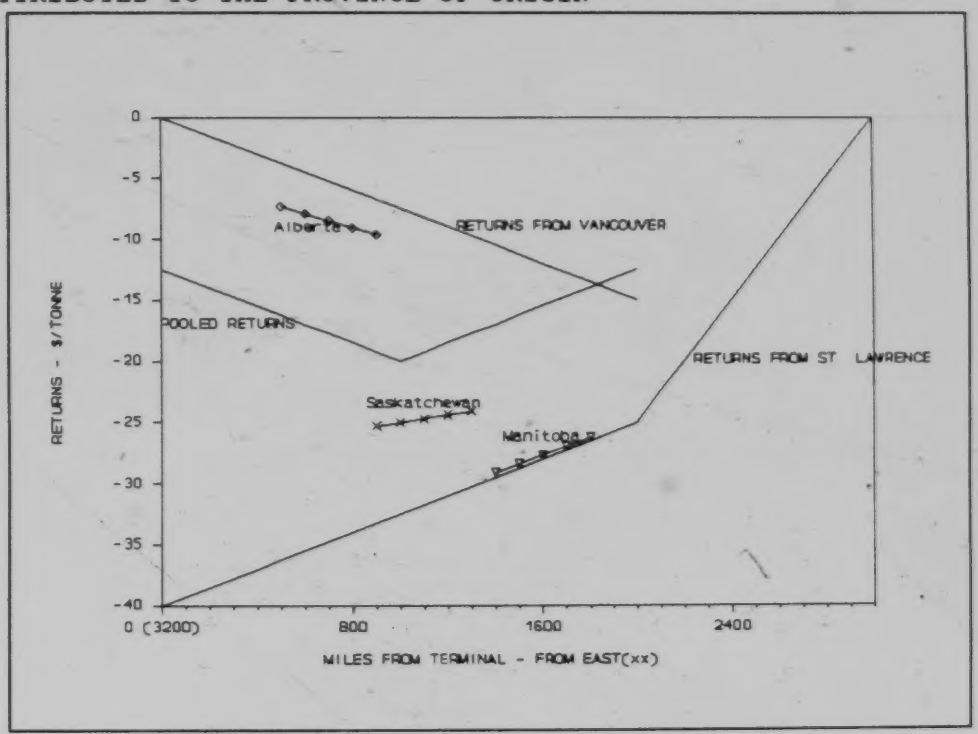
Figure V.1 uses the same parameters to describe the pooled cost structure but attributes the costs and benefits of export direction to the grain's province of origin. For example, 90 percent of Alberta's grain goes west and 10 percent east; 30 percent of Saskatchewan's goes west and 70 percent east; and in Manitoba, 2 percent goes west and 98 percent goes east. These ratios were obtained from data offered by the Canadian Grain Commission "Primary Elevator Shipments Derived from Terminal Elevator Receipts", which were averaged over the period 1979/80 to 1984/85 and were discussed in the previous chapter. The "V" shape represents the current method of cost pooling. It should be noted that all producers are sharing the costs of Great Lakes/ St. Lawrence Seaway System movements and that 50 percent of the grain is moving to eastern and western terminals.

In contrast to the current pooled returns under these constraints, Alberta wheat prices would increase about $9 per tonne under a pooled redistribution using provincial origins. Saskatchewan and Manitoba prices would decrease by about $6 and $12 per tonne, respectively in the same situation. Alberta producers would capture almost all of the apparent west coast premium, pay little of eastern transportation and handling costs but most of the adverse movement costs paid by the pool. Alternatively, Manitoba wheat producers, would pay almost all of the eastern costs and, since only two percent of the province's wheat moves

west, capture a correspondingly small share of the western price premium. Figure V.1 essentially represents pooling by province. The provincial returns relationships are similar to those in the early 1980's, shown in Table IV.10 (p 68).

FIGURE V.1

RETURNS TO PRODUCERS IF MOVEMENT SHARE FACTORS ARE ATTRIBUTED TO THE PROVINCE OF ORIGIN



Source: Derived from previous tables and figures.

These market factors which, contribute to the hypothesized income distortion from pooling, mask the true returns to resources employed in wheat production. The value of these market factors could be shared such that the contributors of the grain that enjoys the premium would receive a more appropriate share of the value. Such a modification of pooling would mean that the producers of eastern exported grains would pay all costs associated with placing their grain f.o.b. vessel at eastern export points and would share in its price. Similarly, western prairie grain producers would enjoy the price received at western export terminals net of the transportation and handling cost involved in placing the grains there.

Figure V.2 is the most general case of this concept, wherein wheat produced at the western boundary of the prairies enjoys all of the west coast price premium and incurs only transportation costs to that terminal. Moving east, an increasing share of eastern (Great Lakes/ St. Lawrence Seaway System) transportation costs are borne along with a decreasing share, at an inverse rate, of the west coast premium. The St. Lawrence price is equivalent to that at western ports, and the St. Lawrence-Thunder Bay price differential is equal to the costs of moving the grain between these ports.

If all pool participants paid the full costs of domestic transportation to export terminals, the eastern

ports would develop an economic catchment basin. Figure V.3 uses the following conditions to illustrate this concept: a) prices are equivalent at St. Lawrence and Vancouver; b) rail transportation to either Vancouver or Thunder Bay from the mid point is $30 per tonne (four times the WGTA producer share); and c) movement east of Thunder Bay costs $25 per tonne. Under this scenario, the economic catchment basin eastern movements extends to the Manitoba-Saskatchewan border.

FIGURE V.2

NON-POOLED DISTRIBUTION OF MOVEMENT SHARE POOLED COSTS AND BENEFITS

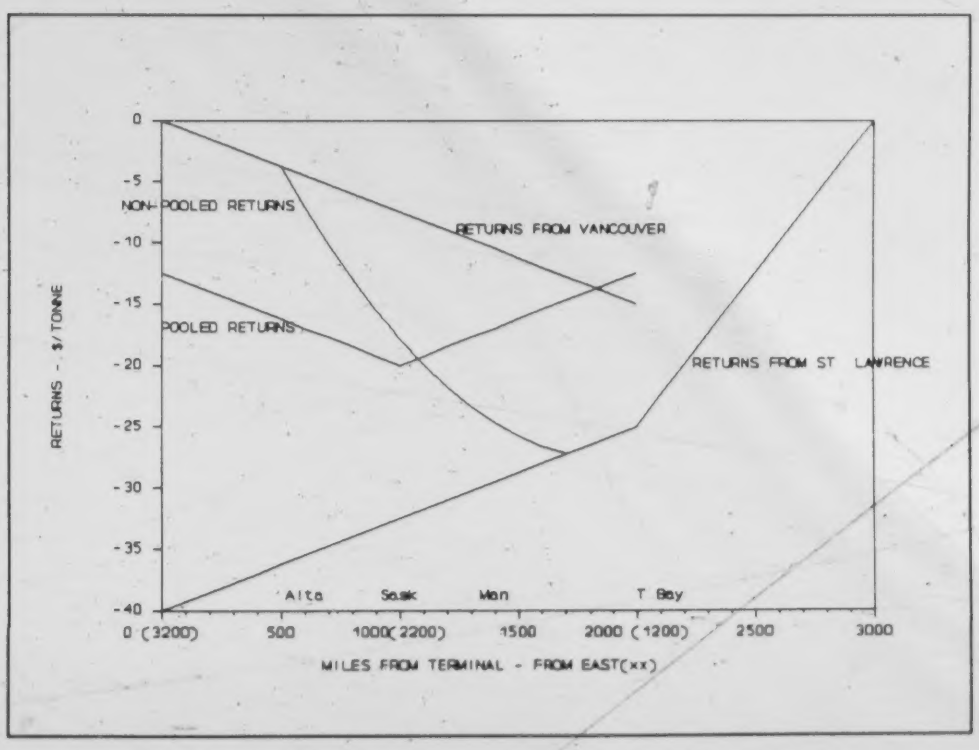
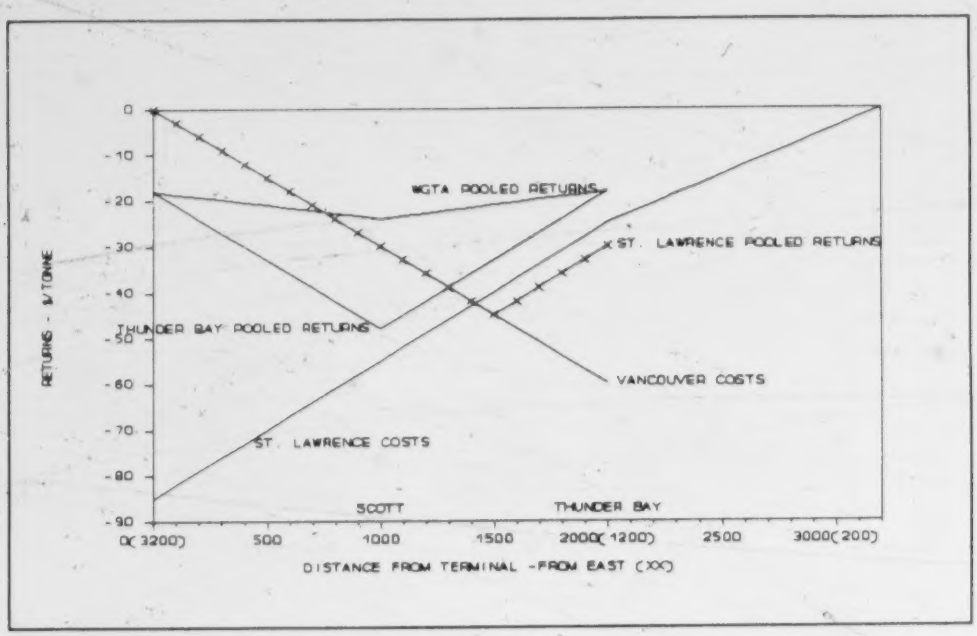


FIGURE V.3

POOLED RETURNS IF PRODUCERS PAY ALL TRANSPORTATION COSTS



Notes: Assumptions: 50 percent of pooled grain moves east and west, and prices are equivalent at St. Lawrence and Vancouver.

1.WGTA pooled returns is the current situation, pooled at Thunder Bay and Vancouver.

2. "Thunder Bay Pooled Returns" represent the situation in which individual producers pay full rail freight to the cheaper of Thunder Bay or Vancouver, which are also the locations where prices enter the pool. Costs east of Thunder Bay are shared by all producers in the pool.

3. "St. Lawrence Pooled Returns" represent the situation in which producers pay all transportation charges to the closer of St. Lawrence or Vancouver, which are also the locations where prices enter the pools. For producers roughly 100 miles east of the total transportation midpoint, returns appear to be lower than the transportation costs indicate. This is because grain from this area would enjoy relatively cheaper water transportation costs east of Thunder Bay than rail freight costs on the prairies.

The difference between the current situation, as illustrated in Figure V.3 (WGTA pooled returns), and the condition whereby producers pay all transportation costs (full cost pooled returns) is the amount of the WGTA benefit. In both cases, the pooled returns of western prairie producers are depressed by the extent to which they share the lower price at Thunder Bay.

C. CANADIAN WHEAT BOARD PROPOSAL

Part of the rationale underlying the Canadian Wheat Board proposal (published in Grain Matters (November 1985), and elaborated by Oleson and Brooks 1986 and 1987) to changing the basis of the pool accounts from Thunder Bay to St. Lawrence was to moderate the extent to which all pool participants are responsible for eastern transportation costs. Under this proposal, individual producers would pay transportation costs to the cheaper of Vancouver or St. Lawrence ports. The assistance offered by the WGTA is of sufficient magnitude to make Vancouver the cheapest transportation route for all producers. The effect of this would be that, to the extent that producers east of the prairie mid point (Scott) would pay more in transportation charges, the pooled costs of eastern transportation and handling would be reduced, thereby increasing the pooled price to all producers.

The Canadian Wheat Board proposal is a step in the direction of rationalizing the economic returns to prairie grain producers. Under the terms of the WGTA, producers pay only a portion of the rail transportation costs to the nearer of Thunder Bay or Vancouver. If, however, the WGTA is amended so that producers pay the full cost of rail transportation, with or without compensation, the transportation cost curves to St. Lawrence and Vancouver may intersect in the prairies (as illustrated in Figure V.3). As the analysis has shown, eastern transportation and handling charges under the current WGTA regime are greater for all prairie delivery points than rail costs (producer share) to Vancouver. This means that the economically rational route of export movements is through western terminals.

D. WESTERN PRICING

The largest component of the difference in market location pooled benefits and costs is the price differential between Vancouver and Thunder Bay. The growth in the price differential has been a long-term phenomenon. Prior to the 1970's, Europe, and specifically Great Britain, were major markets for Canadian wheat exports. These export markets could be reached most cheaply via eastern export terminals.

The 1989 study by the Canada Grains Council provided an examination of the factors that led to the growth of

grain exports from western Canadian ports. It concluded that the primary factor was the ability of the Canadian Wheat Board to make sales at favourable prices at western ports. The domestic and global influences that encouraged those movements are analyzed in that study and will not be dealt with at length here.

During the 1950's and 1960's, long distance ocean freight became relatively cheaper compared to shorter voyages because of the increased cost efficiencies that were inherent in the larger ships that were being built (Canada Grains Council 1989). This allowed west coast exports to become competitive with eastern wheat exports in European markets. During the same period and into the 1970's and 1980's, Pacific Rim countries, particularly China and Japan, began importing substantial volumes of wheat and other grains. This shift in demand and the relative change in the ocean freight rates that favoured longer voyages are the primary reasons the west coast premium began to have economic importance in the mid-1970's.

As the demand for western wheat exports increased relative to eastern exports, the premium charged for western exports grew as well. The premium has, however, outgrown the protection that ocean freight costs alone can support. It was noted in Chapter III that the premium faced by Japanese or Chinese wheat importers from west coast ports exceeds the ocean freight differential between west coast

and St. Lawrence ports.

E. DOMESTIC TRANSPORTATION COSTS

The price differential that the Canadian Wheat Board is able to command at St. Lawrence or Atlantic ports over Thunder Bay is close to the domestic costs of that movement. The issue of sharing the domestic transportation costs among all pool participants is developing in importance for several reasons.

The first reason is that, until the mid 1980's, the majority of Canada's wheat and grain exports were made through eastern terminals. Eastern grain exports still amount to over 40 percent of total grain export volume. During the years that eastern grain exports exceeded western volume, it was evident that western prairie producers benefitted from access to eastern export locations because the markets served by western ports were unable to absorb all of the western prairie export production. This market access benefit was particularly important to Saskatchewan. This province is mid-way between eastern and western pricing terminals in terms of rail transportation costs and produces between 55 and 60 percent of prairie wheat exports. Saskatchewan historically moved almost 70 percent of its export wheat production east. The increases in west coast export capacity and the relative increase in market demand at western ports weaken the contention that eastern sales

benefit western prairie grain producers, including those in Saskatchewan.

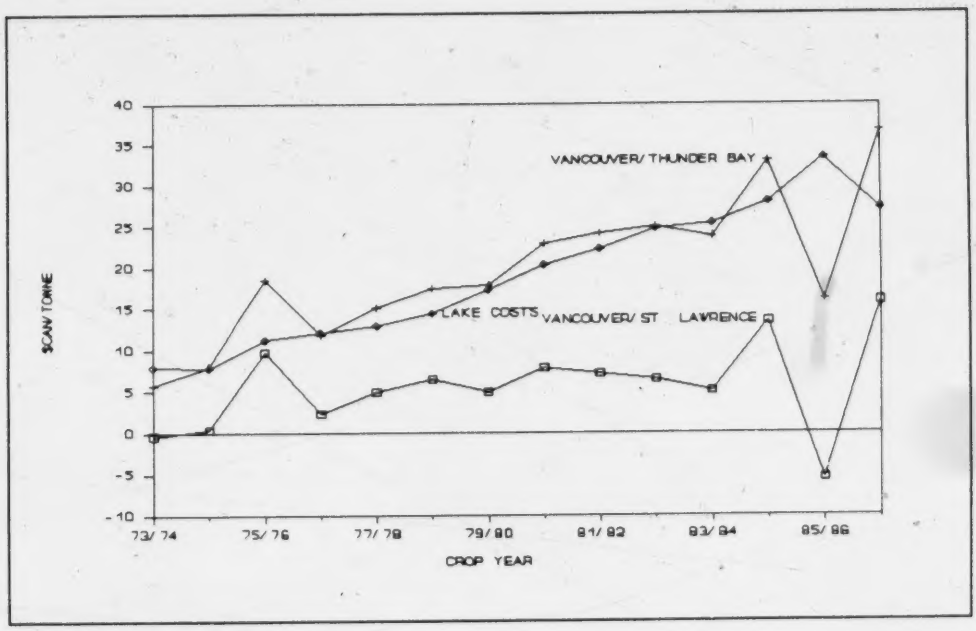
A second reason the issue of sharing eastern transportation costs has been increasing in importance is that lake freight and handling charges have grown at a faster rate than has the producer share of prairie rail freight costs. Producers have enjoyed the protection of the Crow rate which held rail transportation costs at 1929 levels until the introduction of the WGTA in 1984. The increase in the producer share of rail transportation costs under the WGTA has not increased as much as the costs east of Thunder Bay which, with the exception of the At & East assistance, rise and fall reflecting the actual full cost of movements. Until the 1970's, transportation and handling costs east of Thunder Bay were less than twice the maximum rail tariff offered under the Crow rates. By the mid 1980's, these eastern transportation costs represented between three and four times the average rail freight to Thunder Bay or Vancouver.

Figure V.4 shows that almost all of the growth in the Vancouver/Thunder Bay price disparity is attributable to growth in Great Lakes/St. Lawrence Seaway System transportation and handling costs. The Vancouver/ St. Lawrence price difference may be growing but is observed to be generally less than $5 per tonne in the period 1973/74 to 1985/86. The eastern transportation and handling costs

appear to be growing at a steady rate.

FIGURE V.4

COMPARISON OF TERMINAL PRICE DIFFERENCES AND EASTERN TRANSPORTATION COSTS, 1973/74 TO 1986/87



Sources: Derived from Canada Grains Council, 1973/74 to 1985/86, Canadian Grains Industry Statistical Handbook

F. SUMMARY

The problem analyzed concerns the effect on the net price of wheat received by prairie farmers due to the Canadian Wheat Board pooling of price and domestic transportation costs in the movement of export grain to different ports. The Canadian Wheat Board price pooling system has not evolved to distribute the net sales values of

these differences to the producers whose wheat is sold at each export terminal. In economic terms, the current pooling distribution of the locational market factors analyzed (i.e. the value of the west coast premium, the net eastern transportation and handling costs and the costs of adverse movement) does not appear to be equitable. The value of Canadian Wheat Board grain exports from Pacific terminals is largely attributable to grains grown on the western prairies. Similarly, the net costs of domestic grain transportation and handling east of Thunder Bay are largely incurred by grain of eastern prairie origin. The existing Canadian Wheat Board price pooling system distributes net returns from grain sales according to participation in the pool but does not distribute the returns from different markets to the producers whose grain is sold in those different markets. This failure to transmit market signals to wheat producers has economic and social implications concerning where, how, and how much wheat is produced in the prairies. There are also implications concerning the domestic grain transportation system and government policy pertaining to grain movements.

VI. DISCUSSION

A. INTRODUCTION

The Canadian Wheat Board price pooling policy was not originally intended to influence the location of grain production. The Canadian Wheat Board Act requires that producers pay all charges (primarily local elevation and handling costs), as well as prairie rail freight, to place their wheat at export position. Vancouver and Thunder Bay were originally viewed as equivalent export locations that enjoyed a similar pricing structure. Market and transportation developments have fundamentally changed the performance of Thunder Bay and Vancouver as equivalent export locations. Thunder Bay is no longer a relevant wheat export pricing location since little wheat is sold there. The Thunder Bay terminals have evolved into transfer and cleaning facilities in response to the emergence of St. Lawrence terminals as preferable eastern export locations.

B. MARKET POWER

Many authors have attempted to characterize the world wheat markets in economic models based on observed market and pricing phenomena. Most conclude that the pricing behaviour observed in the world wheat markets is some

combination between monopoly and oligopoly behaviour, with pockets of market power in local markets.

This sort of market pricing behaviour can be observed at west coast terminals. At these terminals, the Canadian Wheat Board has to compete primarily with American grain exports from Portland. The west coast premium is observable at both Vancouver and Portland. Part of the reason western wheat exports are able to command a favourable pricing regime when compared to the nearest competitive alternate export locations (i.e. U.S. Gulf or St. Lawrence ports) is that the same limited number of sellers is present at these alternative locations. The high concentration ratio of these companies at all of the North American grain export locations, as well as their dominance as domestic grain merchants, allows these companies some latitude in price-setting. The extent to which they control a majority of the North American wheat exports and act as a group to maximize their collective revenues, may be an indication that price differences between continental export terminals are not completely a function of ocean freight rates.

C. SYSTEM CONSTRAINTS

There are a number of critical capacity constraints in the North American grain handling system, which may be a further influence that North American grain exporters use to their advantage to support the west coast premium. The

transportation and handling costs on grain movements to competitive export locations, either through the U.S. Gulf or St. Lawrence terminals are the basic continental causes of elevating the west coast prices. Should one or both of these routes surpass its optimum physical handling capacity, there would be price spillover effects felt at the other continental export locations. The optimum physical handling capacity on all routes is less than the maximum capacity. The marginal increase in costs over the optimum capacity would serve to direct wheat to other lower cost locations and/or to support a grain price premium at the other locations.

The closure of the Great Lakes/St. Lawrence Seaway System during the winter months may in part support the premium not only while that route is essentially closed, but also when it is open due to the perceived benefit of continuity of supply at the western ports. In the United States, the northern Mississippi is closed to barge traffic during the winter months. This transfers some grain movements to the rail system, which, as in Canada, is more expensive than water movement. These winter transportation capacity constraints are evident in the prices charged during these periods. Analysis of the apparent west coast premium revealed that the east-west price differential narrowed in the winter. There were indications that the eastern price increased, perhaps as a method of rationing

the scarce grain supplies in eastern and Gulf terminals during these months.

The capacity of the eastern Canadian grain transportation and handling system must meet the demands of more than export grain movements from the prairies. Central Canada produces substantial volumes of wheat, corn, barley and soybeans, all of which enter the eastern grain transportation system and compete for its capacity. Many of these grains do not enter export channels. Both domestic consumption of these grains and the movement of prairie grains to eastern locations for domestic use reduce the eastern export capacity for grains from the prairies.

The magnitude of the premium is based on the underlying features previously mentioned. Growth in the premium will also be based on these features, especially on the increasing demand from Pacific Rim exporters. The system constraints on the other continental grain export terminals, which primarily serve the large western U.S.S.R., Mediterranean and African markets, ensure that Pacific Rim grain importers must buy from North American Pacific terminals and pay a premium for that access.

D. ECONOMIC ISSUES

The resource allocation theory explained in Chapter II, whereby producers use the price of alternative outputs to allocate productive resources in their decision

of what and how to produce, provides a theoretical indication of the productive response that would result from such relative changes in wheat prices. The changes in prices are termed relative because it is the relationship between wheat prices and all other commodities that would change. The absolute prices of all commodities are a complex function of domestic and international markets and policies. In 1986/87 wheat prices in Alberta would have been almost 24 percent higher compared to the current pooled distribution had pool revenues been distributed to the province from which the grain originated. The price signal resulting from a pooling policy change would encourage individual Alberta producers to reallocate productive resources away from other agricultural production toward wheat production. According to economic theory, the extent of the individual productive response would be a function of both the change in relative prices between wheat and all other possible outputs, and the shape of the individual's isoresource frontier. An increase of this magnitude in the relative price of wheat would encourage the producer to allocate more productive resources towards wheat production. Similarly, a decrease in the relative price for wheat in Saskatchewan and Manitoba would be a signal to producers in those provinces to reallocate resources away from wheat production and into alternative enterprises. The summation of individual responses would be the change in provincial

and prairie wheat production.

In practice, it would be difficult to predict the productive response from a relative change in the price of wheat of this magnitude. An analysis of this nature would rely on the extension of historical output responses to such relative price changes. To a large extent, a relative change of this magnitude in price of wheat compared to all alternative outputs is unprecedented. Grain prices have been volatile. However, to the degree that individual grains are substitutable with each other, grain prices tend to move in concert with each other.

The sensitivity of productive responses by wheat producers to price changes does not always conform to traditional economic theory. The expected response to a decrease in the price of wheat is that fewer acres would be planted. Similarly, price increases should cause increases in wheat acreage. In the 1980's, however, with the exception of two years, the wheat acreage planted moved in an opposite direction to the year-to-year change in initial prices. Generally, when initial prices rose, wheat acreage declined. There are obviously a number of factors that affect the productive response in addition to the short-term pricing signal.

E. THE MANDATE OF THE CANADIAN WHEAT BOARD

This analysis suggests that the current state of price pooling by the Canadian Wheat Board is not reflective of the intent set out in the Canadian Wheat Board Act. The Canadian Wheat Board has been authorized to market specific grains for export and domestic human consumption from the prairie region. Its mandate has been to sell these grains to the best advantage and to return net pooled receipts without regard to the source of production or point of Board sales.

The Canadian Wheat Board has always had a mandate to treat the prairies as a homogenous production area: the Canadian Wheat Board Act states that individual producers are to pay all costs involved in placing their grain in export terminals. Change in transportation and marketing structures have led to Vancouver replacing Thunder Bay as the port of choice and hence made the west coast a favoured price destination over eastern locations. This situation is evidence that the Canadian Wheat Board's original mandate is contributing to significant regional income distortions within the Canadian Wheat Board designated area.

The Canadian Wheat Board is charged with providing its producers a fair and equitable price for their grain marketings. The lower boundary of the pricing framework is the federally guaranteed initial price. Above this limit, the Canadian Wheat Board distributes the value of marketed

grains it can extract from the world grain market on a pro rata participation basis. In the presence of a world grain market that prices grain at west coast terminals higher than it does at Thunder Bay or St. Lawrence ports, there exists the possibility that the pooling system is not fair and equitable. The definitions of fair and equitable that support this charge are economic ones. Price pooling arrangements to satisfy these economic claims would reflect proximity to tidewater and to export price determination points.

F. POLICY ISSUES

Under the Canadian Wheat Board Act, producers (shippers) are individually responsible for all charges involved in moving their grain to export position. The benefit offered by the Crow and WGTA rates goes to the individual producer (although paid to the railways) and is an increasing function of distance from the point of shipment to either Thunder Bay or Vancouver. When the Canadian Wheat Board was formed, Thunder Bay prices were at least as high as those at Vancouver. As long as the Canadian Wheat Board was able to increase the price at St. Lawrence and Atlantic ports over Thunder Bay by at least the costs of transportation, there was no net loss to the pool. However, as the Thunder Bay price declined relative to Vancouver and as the capacity of west coast ports

increased to handle western prairie export production, the pooling of eastern transportation and handling costs assumed a larger role in the net returns of prairie wheat producers. There is clearly a cost borne by western prairie producers in having these charges included in the pool.

The role of domestic rail costs in determining the direction of export grain movements has not been fully examined in the context of pooling. The assistance to grain producers provided by the Crow and WGTA rates has undoubtedly had a large influence on the development of the Canadian Wheat Board designated area socially, economically and as a grain exporting region. Some observers believe that the development process has reached a maturation point at which the transportation assistance provided by the WGTA is no longer warranted and may in fact be counter productive to further economic development in the region.

The goal of economic efficiency is attained by ensuring that the market structure is regulated so that returns from the employment of scarce resources are maximized. In reality, the distribution of wealth or income from the employment of these resources is a compromise between economic efficiency and a sense of social equity. The pursuit of price equivalency through the existing pooling policy significantly distorts the price signal. This distortion in turn effects how and where wheat is produced for export. This has not been viewed as a problem

to date and there may be several reasons for this.

The primary reason may be the evolving nature of the premium. Only since 1979/80 has the gross added value of the premium exceeded $100 million in a pool that has distributed between three and four billion dollars annually to prairie farmers. It takes time for a problem to be recognized as such when the factors contributing to it evolve slowly and when the impact of the income distribution distortion may be marginal.

Remedial policies to address the distribution of market location cost factors could be appropriate on several grounds. A necessary prerequisite would be acknowledgement that the existing situation is not optimal in terms of efficiency. The distortion in provincial wheat incomes presented in the previous chapter demonstrates that the parameters included (or excluded) in the existing pooling mechanism do not reflect the true economic potential. Another necessary condition would be the political and social will to treat this economic inefficiency.

While economic efficiency is a desirable goal, policies intended to respond to an economically inefficient situation will, in many cases, attempt to minimize the economic effect on those who would be disadvantaged by such a change. In effect, the policy response may well be to strive for a more economically efficient situation while remaining cognizant of the economic and social repercussions

throughout the economy. The evidence documented in this study indicates that the current pooling system causes relative wheat prices to be lower in the western prairies and higher in the eastern prairies. Changing the pooling method might therefore make the western prairie producer better off while leaving producers in the eastern prairies worse off. Although its impact can be profound both locally and regionally, the local price of wheat is only one of many that influence the economic health of the prairies as a region .

In recent years, government agricultural policy and financial intervention have been directed towards maintaining income levels of prairie grain producers. Maintenance of the present pooling mechanism is only one of the policy influences that determines where and how much grain is produced in Western Canada. Much of the government intervention is in the form of direct assistance that is a function of production, i.e. payments per acre or per tonne. There could be widespread effects if changes in the market signals that a modification of the pooling mechanism might generate affected where and how much grain was produced. Federal and provincial governments have injected large amounts money in support of western grains and oilseeds production in recent years. Much of this money has been committed in response to international or climatic conditions that have been viewed as transitory or temporary

aberrations. The goal of these policy responses has been to maintain the productive capacity of prairie grain farmers such that, when these transitory aberrations pass, the fundamental capacity to produce export cereals and oilseeds has not been eroded.

It could be that domestic and international pressures are indicating that the maintenance of the status quo is not a viable long-term option. There is strong pressure to decrease government expenditures in the grains and oilseeds sector. The reasons for this are not limited to the financial burden of maintaining the industry; in part they reflect the feeling that agriculture as an industry must become more market-responsive. The treatment of agriculture as an industry that must stand on its own like any other marks a shift in the historical perception that society owes agriculture a favoured status because food is a basic human necessity. Food consumers are becoming increasingly indifferent to who produces their food.

Agriculture, as an industry, may not be well served in the long run as an industry by policies that do not transmit market signals. The distortion of the pricing signal caused by current pooling is causing a misallocation of resources. If the price for wheat in parts of the Canadian Wheat Board designated area decreased to the point where it was no longer profitable to grow wheat, some producers would be forced to either produce other commodities or to leave

agriculture completely. Historical experience has been that production overall does not decline when producers leave the industry. Other producers buy the land and it remains in production. The cost of relocating displaced producers, is however, a very real human and social cost.

In economic terms, farmers in the western prairies would be better off if they received the full value of efficient market location returns. It is not so obvious that the lot of farmers in the eastern portion of the prairies would be worsened in the long run. In the eastern prairies in the short run, lower returns for export wheat sales would cause lower incomes. Economic theory suggests that a fall in the price of wheat would be a signal to either change the method of production to suit the lower prices, and/or be a signal to produce different agricultural output. The former change would not be sufficient to overcome the loss of income inherent in having their grain move through lower priced eastern terminals with their higher transportation cost. The latter alternative, i.e. diversification of output, could possibly overcome and surpass the present levels of eastern prairie incomes. Since it can be expected that all economic factors would be dynamic in the long run, both the ultimate production distribution of wheat and other crops and the distribution of wealth within the Canadian Wheat Board designated area can only be speculated upon.

G. ALTERNATIVES

The most efficient method of distributing the returns from export wheat sales in the Canadian Wheat Board designated area would be to allow prairie producers to individually market their own grain. The timing, price and location of those sales would be at the discretion of the individual producer. In the absence of a central selling agency such as the Canadian Wheat Board, the private grain trade would probably assume a significant role similar to that it presently plays for the domestic feed grain market. Individual producers would have little market power. The ability of the private grain trade to draw grain from producers for eventual export sales would be based on price, as occurs in the United States.

An alternative would be to retain both the Canadian Wheat Board as a central selling agency and the concept of pooling, but, also to subdivide the designated area into smaller regions reflecting the catchment basins of export terminals. The smaller pooling areas could be identified by separate export locations on an annual or semi-annual basis. For example, if 10 percent of an area's sales to the Canadian Wheat Board went to Thunder Bay and 90 percent went to west coast terminals, the net returns to producers in that area would reflect the returns from those locations in accordance with the costs and prices received. The individual producer would not have the ability to influence

the direction his grain moves; that would remain at the discretion of the Canadian Wheat Board. This type of arrangement preserves the original mandate of the Canadian Wheat Board to guarantee all pool participants equal market access. Pooled market access is a combination of access to the transportation network and the sharing grain of prices over time at given locations.

The issue of sharing of Great Lakes/St. Lawrence Seaway System costs is also accommodated using this method. Producers could continue to pay the rail freight costs to the nearer of Thunder Bay or Vancouver, but any additional costs incurred in grain handling or transportation would be a deduction from the export location's pool. Adverse movement costs could be similarly treated among local pools to reflect the costs involved.

The combination of a favourable price regime at western ports and the burden of domestic transportation and handling costs east of Thunder Bay would continue to make Pacific ports the desired grain export facilities. The concerns of how to ration the finite west coast terminal handling capacity and how grain exports would move to those terminals are not addressed here. The Canadian Wheat Board is currently able to distribute grain movements between eastern and western terminals according to market demands.

H. FURTHER RESEARCH PERSPECTIVES

This study does not purport to be a comprehensive analysis of all of the influences of Canadian Wheat Board pooling on prairie grain producers' incomes. Further complementary research would be relevant to the examination of Canadian Wheat Board pooling.

The most valued complementary research would be an investigation of the magnitude of the effect of the west coast premium in the barley pool. Almost 75 percent of Alberta's barley export production moves through west coast terminals, representing almost 90 percent of western Canadian barley exports. The impact of the west coast premium and, to a lessor extent, eastern transportation costs could be quite large. Similarly, almost 80 percent of Canada's durum exports are made through eastern ports, indicating that the potential for a more economically efficient income redistribution is present in this crop as well. Since the durum and barley pools are smaller in value overall, the total gross values would be smaller than in the wheat pool. However, the difference expressed in unit values may be significantly greater. Authoritative research in this area might require actual Canadian Wheat Board pricing data since suitable surrogate price series do not exist.

A useful policy perspective would be provided through an extension of this thesis that employed regional supply

response price elasticities to analyze the change in production patterns and the resulting income distribution from that response. This thesis has employed a static analysis, whereas the suggested study would be dynamic. Given the fundamental change in grain price relationships that modifications to the pooling system might cause, it is not clear whether the appropriate elasticities could be developed. Analysis of this nature could, however, provide reasonable estimates of the magnitudes of change from a perspective of both the location and intensity of grain production and the change in regional incomes.

The analysis has only briefly addressed the concept of pooling in the context of the current debate on grain transportation assistance. Nor has the analysis fully explored pooling in the context of the cost and targeting of government assistance to grain producers. Research into the impact of Canadian Wheat Board pooling on the quality of life and into its effect on rural communities in the Canadian Wheat Board designated area would constitute valuable social knowledge.

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